COMPARATIVE STUDY AND ADVANTAGES OF LAPAROSCOPIC VENTRAL HERNIA MESH REPAIR VERSUS CONVENTIONAL OPEN MESH REPAIR

Dissertation submitted to

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MADURAI–625020

CERTIFICATE

This is to certify that the dissertation entitled "**COMPARATIVE STUDY AND ADVANTAGES OF LAPAROSCOPIC VENTRAL HERNIA MESH REPAIR VERSUS CONVENTIONAL OPEN MESH REPAIR"** is a record work done by **Dr. S.UMAMAHESWARAN ,** under my direct supervision and guidance during the period of January 2017 -September 2017.

This has been submitted in partial fulfillment of the award of M.S.

Degree in General Surgery (Branch I) to The Tamil Nadu Dr. M.G.R.

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This is to certify that the dissertation entitled **"COMPARATIVE STUDY AND ADVANTAGES OF LAPAROSCOPIC VENTRAL HERNIA MESH REPAIR VERSUS CONVENTIONAL OPEN MESH REPAIR"** is a bonafide research work done by **Dr.S.UMAMAHESWARAN**, Post Graduate Student, Department of General Surgery, MADURAI MEDICAL COLLEGE AND GOVERNMENT RAJAJI HOSPITAL, MADURAI, under the guidance and supervision of **Prof.Dr.S.R.DHAMOTHARAN M.S.,FIAGES,** Professor, Department of General Surgery, MADURAI MEDICAL COLLEGE AND GOVERNMENT RAJAJI HOSPITAL, MADURAI.

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DECLARATION

I, **Dr.S. UMAMAHESWARAN** solemnly declare that the dissertation titled **"COMPARATIVE STUDY AND ADVANTAGES OF LAPAROSCOPIC VENTRAL HERNIA MESH REPAIR VERSUS CONVENTIONAL OPEN MESH REPAIR"** is a bonafide work done by me in the Department of General Surgery at Government Rajaji Hospital during the period of January 2017 to September 2017.

I also declare that this bonafide work or a part of this work was not submitted by me or any other for any award, degree and diploma to any university, board either in India or Abroad. The dissertation is submitted to The Tamilnadu Dr.M.G.R. Medical University, towards partial fulfillment of requirement for the award of **M.S**. **DEGREE IN GENERAL SURGERY (BRANCH** I).

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CONTENTS

INTRODUCTION

Ventral hernias (VH) are occurring as a result of weakness in the musculofascial layer of the anterior abdominal wall. Unlike all other hernias that surgeon evaluate and repair, Incisional hernias(IH) are unique in that surgeon contributes to the source and cause of the disease. Incidence 6-13 % .

The ventral hernia(VH) repair is based on the principle of rives-stoppa open tension free mesh repair. In the laparoscopic technique, the mesh is placed in an intraperitoneal location and where the rise in the intra-abdominal pressures (IAP) is totally diffused along each square inch and keeps mesh in place.

The laparoscopic approach helps Complete visualization of the fascia underlying the previous incision allows for identification of smaller swiss cheese defects that may be missed in an open approach.

Nevertheless, open hernia repair can be a major operation with considerable morbidity due to mesh-related infections. “An increasing interest in laparoscopic surgery and the availability of new materials have encouraged the adoption of laparoscopic techniques in ventral hernia repair”.

AIM AND OBJECTIVES

To Compare the Advantages And Efficacy of Laparascopic ventral hernia(LVH) mesh repair over conventional open ventral hernia (OVH)mesh repair

1. Patient selection
2. Operative time for laparoscopic and open ventral hernia repair
3. Intra and post operative complications
4. Post operative pain and Duration of analgesics used
5. Time until resumption of diet and movement
6. Period to early return to normal activity
7. Length of hospital study
8. Recurrence and Re-recurrence after both procedures

REVIEW OF LITERATURE

SURGICAL ANATOMY OF ABDOMINAL WALL

EMBRYOLOGY

The Abdominal wall – derived from lateral plate of Embryonic mesoderm

Three principal layers are

1. Ectoderm
2. Endoderm
3. Mesoderm

Mesoderm forms

1.Somatic layer

2. Splanchnic layer

The Splanchnic layer with endoderm – gives rise to

1. Muscle
2.Blood vessels
3. Lymphatics and connective tissues of GI tract

The Somatic layer gives rise to – Abdominal wall

At third month of pregnancy - Abdominal wall closes except at umbilical ring.

Umbilical ring - closes after birth

SURGICAL ANATOMY

Nine layers of abdominal wall are:

1.Skin

2.Subcutaneous tissue,

3.Superficial fascia,

4.External oblique muscle,

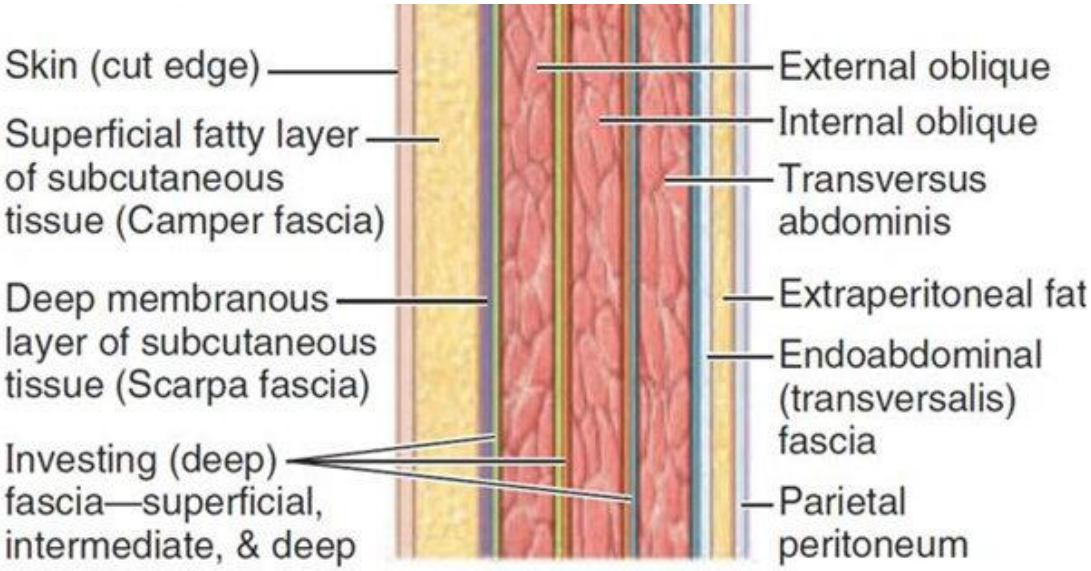
5.Internal oblique muscle,

6.Transversus abdominis muscle,

7.Transversalis fascia,

8.Preperitoneal fat and Areolar tissue,

9. Peritoneum.



Layers of Abdominal wall

SUBCUTANEOUS TISSUE

It contains

1.Campers fascia

2.Scarpas fascia

Campers fascia - is superficial fatty layer

Scarpas fascia - deep connective tissue layer continues with the fascia lata of the thigh.

Scarpas fascia – helps in skin healing evenly .

ABDOMINAL WALL MUSCLES

Antero lateral abdominal wall – has 3 muscle layers

1. External oblique(EO)
2. Internal oblique(IO)
3. Transversus abdominis(TA)

These 3 muscles gives Aponeurotic layer – covers the Rectus abdominis muscle called as Rectus sheath.

EXTERNAL OBLIQUE MUSCLE

1. Large , thick muscle
2. Arises from lower 7 ribs
3. Direction – superolateral to infero medial

4. Most posterior fibers insert in the – anterior part of iliac crest

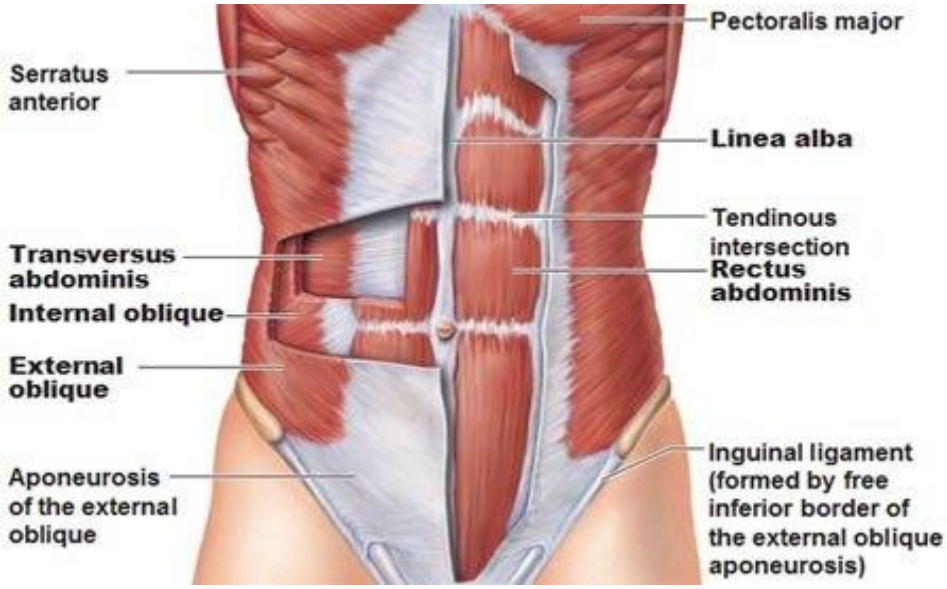
In mid clavicular line – it forms an aponeurotic layer ,which passes anterior to the rectus sheath , and merge at linea alba.

The lower end of external oblique – covers the spermatic cord in front and behind like a tunnel.

EO muscle forms Inguinal ligament in the lower half by inserting from the Anterior superior iliac spine to the Pubic tubercle.

INTERNAL OBLIQUE

- Derived from iliopsoas fascia near the lateral end of inguinal ligment, and anterior two thirds of iliac crest and lumbo dorsal fascia.
- Direction of fibres – inferolateral to superomedial.
- Upper fibers insert to the - lower five ribs



Muscle layers of abdominal wall

The central fibers – gives aponeurosis at semilunar line ,which divide into anterior and posterior laminae ,which above the line of Douglas covers the Rectus abdominis muscle anteriorly and posteriorly.

Below the line of Douglas - it covers the anterior part of rectus muscle as part of anterior rectus sheath.

Some Lower fibers of IO - forms cremaster muscle.

TRANSVERSUS ABDOMINIS MUSCLE

- Smallest muscle
- Derived from the lower six costal cartilages and spinal process of lumbar vertebra , iliac crest and ilio - psoas fascia, lateral part of inguinal ligament.
- Runs transversally –forms flat aponeurosis.

- Above the line of douglas - it covers anteriorly and posteriorly of the rectus abdominis muscle .
- Below the line of douglas - it covers the anterior layer of rectus abdominis muscle.
- Lower most fibers gives rise to conjoint tendon along with internal oblique muscle.

TRANSVERSALIS FASCIA

- Transversalis fascia covers the abdominal cavity as an envelope, and also covers the deep layers of Transversus abdominis muscle.
- It binds with muscles and aponeurotic layers and covers the weak areas of abdominal wall.
- An weak area in transversalis fascia results in hernia.

RECTUS ABDOMINIS MUSCLE

- Paired ribbon like muscle
- Arises from the fifth and sixth and seventh and eigth costal cartilages vertebral processus.
- Inserts into the pubic crest and pubic symphysis
- It is composed of long parallel fascicles with interrupted tendinous junctions and attaches to the anterior rectus sheath.

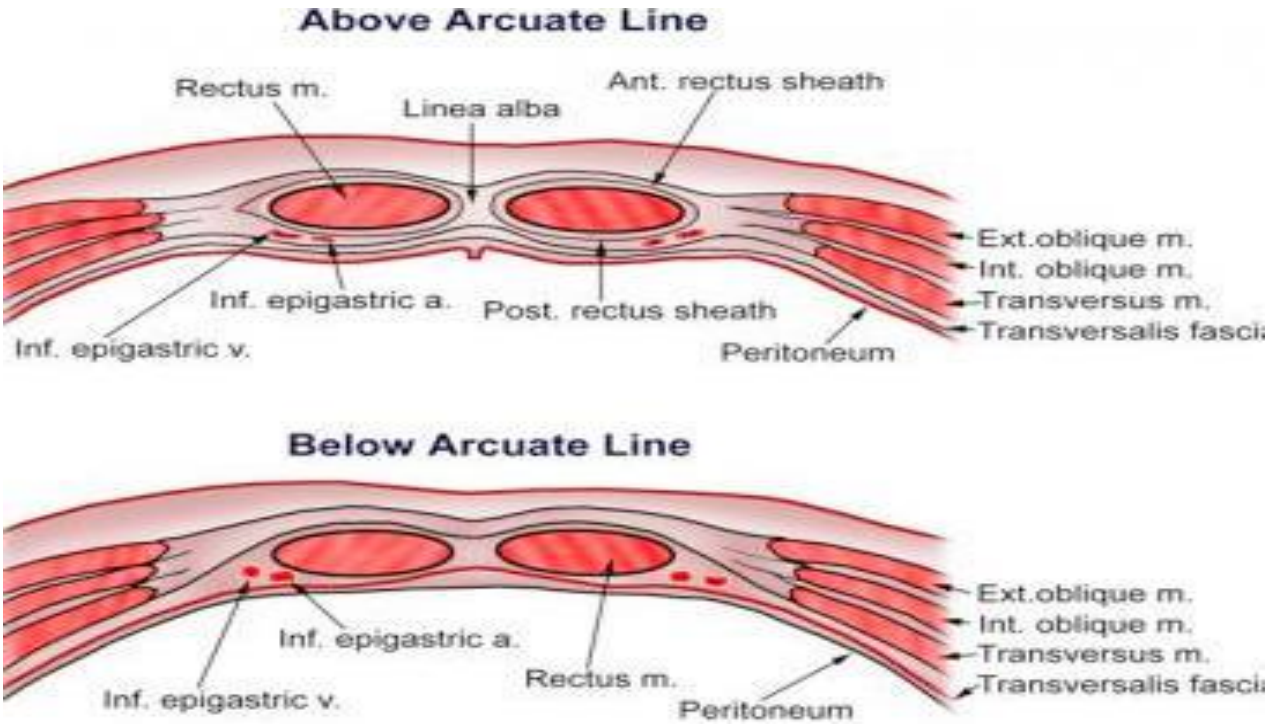
- No attachment with the posterior rectus sheath.
- Muscles of either side are separated by linea alba.
- Arcuate line - above the line is covered by arnterior rectus sheath and posterior rectus sheath and below the line it is covered only in the anterior part. Posterior part is not covered.

LINEA ALBA

- It is a Decussation of criss – crossed fibers of Aponeurosis of abdominal muscles .

- The rectus abdominis muscles are held closely in apposition near the anterior midline by the linea alba

- It is wide above the umbilicus and below the umbilicus it is narrow, and facilitating the placement of surgical incisions in the midline without entering the right or left rectus sheath,



PREPERITONEAL SPACE

Preperitoneal space lies between transversalis fascia and parietal peritoneum contains adipose and areolar tissue and the following :

1. Inferior epigastric artery and vein

2. Medial umbilical ligament

3. Median umbilical ligament, remnant of urachus

4. Falciform ligament of the liver

Ligamentum teres, forms the free margin of the falciform ligament which is obliterated umbilical vein.

The preperitoneal space helps in dissecting the hernia sac and repair of inguinal hernia through preperitoneal approach for mesh placement.

THE PERITONEUM

ANATOMY

The peritoneum consists of a single sheet of simple squamous epithelium of mesodermal origin, termed *mesothelium*, lying on a thin connective tissue stroma.

The surface area is 1.0 to 1.7 m^2, about that of the total body surface area.

In males, the peritoneal cavity is sealed, whereas in females, it is open to the exterior through the ostia of the fallopian tubes.

The peritoneal membrane is divided into parietal and visceral components.

The parietal peritoneum covers the anterior, lateral, and posterior abdominal wall surfaces as well as the inferior surface of the diaphragm and the pelvis.

The visceral peritoneum covers most of the surface of the intraperitoneal organs and the anterior aspect of the retroperitoneal organs.

The peritoneal cavity is subdivided into interconnected compartments or spaces by 11 ligaments and mesenteries. The peritoneal ligaments or mesenteries include the coronary, gastrohepatic, hepatoduodenal, falciform, gastrocolic, duodenocolic, gastrosplenic, splenorenal, and phrenicocolic ligaments and the transverse mesocolon and small bowel mesentery .

These structures partition the abdomen into nine potential spaces: right and left subphrenic, subhepatic, supramesenteric and inframesenteric, right and left paracolic gutters, pelvis, and lesser space.

These ligaments, mesenteries, and peritoneal spaces direct the circulation of fluid in the peritoneal cavity and thus may be useful in predicting the route of spread of infectious and malignant diseases.

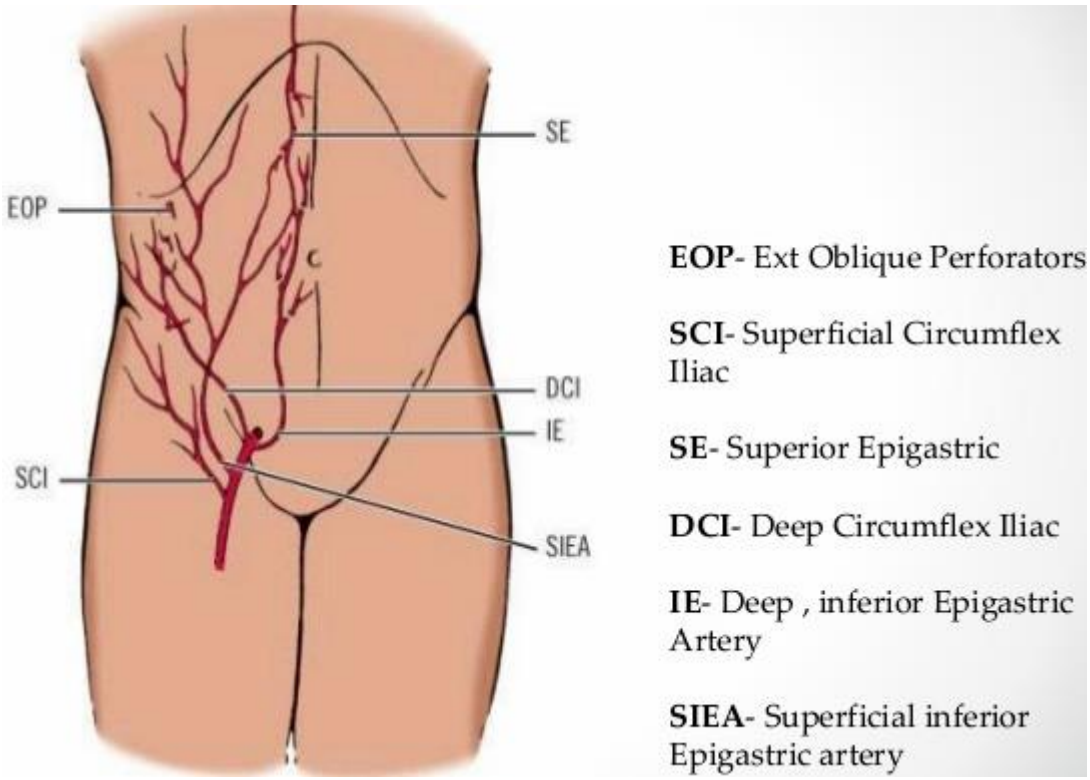
The blood supply to the visceral peritoneum is derived from the splanchnic blood vessels, whereas the parietal peritoneum is supplied by branches of the intercostals, subcostal, lumbar, and iliac vessels.

VESSELS AND NERVES OF THE ABDOMINAL WALL

VASCULAR SUPPLY

- last six intercostals and four lumbar arteries,

- superior and inferior epigastric arteries,
- deep circumflex iliac arteries.



Interostal and lumbar arteries runs between the TA and IO muscles.

The distal ends pierce the lateral margins of the rectus sheath at different levels and anastomoses with branches of the superior and inferior epigastric arteries.

The superior epigastric artery - terminal branch of the internal mammary artery, enters through the costoxiphoid space , and anastomose with branches of the inferior epigastric artery at rectus sheath.

The inferior epigastric artery - enter the lateral rectus sheath at the semilunar line of Douglas.

The deep circumflex iliac artery - from the lateral aspect of the external iliac artery , supplies the iliac crest, near the anterior superior iliac spine.

THE VENOUS DRAINAGE

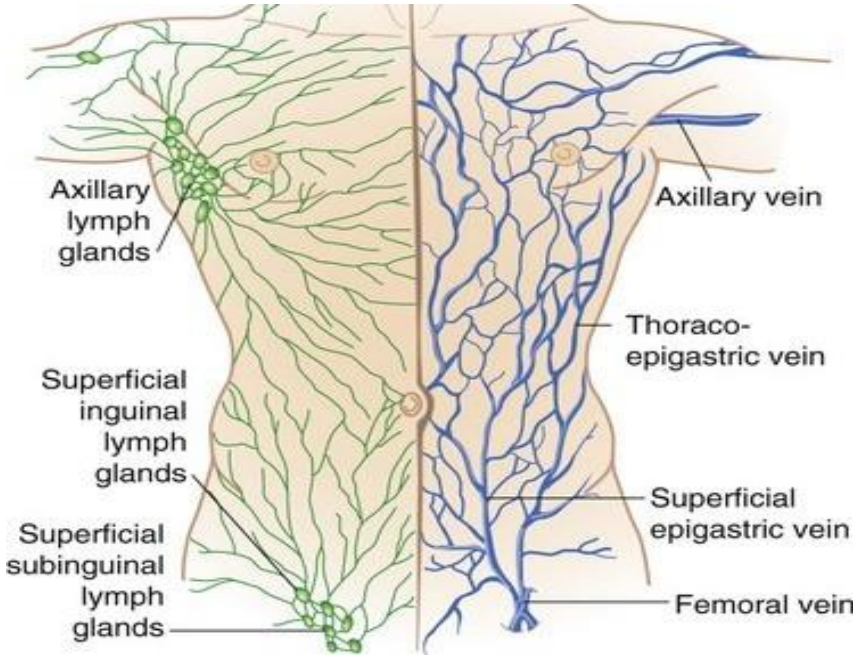
Superficial veins above the umbilicus - empties into superior vena cava , internal mammary, intercostal, and long thoracic veins.

Below the umbilicus—the superficial epigastric, circumflex iliac, and pudendal veins—drains at saphenous vein and to the inferior vena cava.

The anastomoses of either side helps forms collaterals in case of proximal and distal obstruction above the umbilicus and below the umbilicus .

In portal venous obstruction – paraumblical vein helps form collateral with the systemic veins

If dilated the paraumblical veins may form caput medusa around the umbilicus .

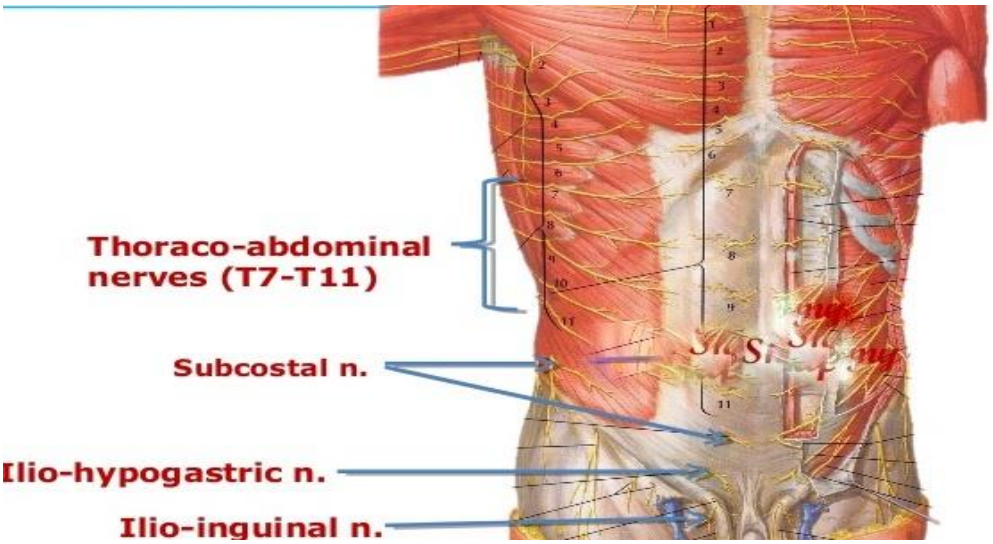


LYMPHATIC SUPPLY

- Forms similar pattern to venous drainage
- Lymphatic vessels of supraumbilical region drain to axillary lymph nodes
- Lymphatic vessels of infraumbilical region drains into superficial inguinal lymph nodes.
- Sometimes the lymphatics from liver may communicate with the lymphatics of anterior abdominal wall at the level of umbilicus through the ligamentum teres.
- Hence it may cause a Sister Mary Joseph nodule at the level of umbilicus by spreading from liver.

INNERVATION

The anterior rami of the thoracic nerves follow a curvilinear course forward in the intercostal spaces toward the midline of the body.



The upper six thoracic nerves end near the sternum as anterior cutaneous sensory branches. Thoracic nerves 7 to 12 pass behind the costal cartilages and lower ribs to enter a plane between the internal oblique muscle and the transversus abdominis.

The seventh and eighth nerves course slightly upward or horizontally to reach the epigastrium, whereas the lower nerves have an increasingly caudal trajectory. As these nerves course medially they provide motor branches to the abdominal wall musculature.

Medially they perforate the rectus sheath to provide sensory innervation to the anterior abdominal wall. The anterior ramus of the 10th thoracic nerve reaches the skin at the level of the umbilicus and the 12th thoracic nerve innervates the skin of the hypogastrium.

The ilioinguinal and iliohypogastric nerves often arise in common from the anterior rami of the 12th thoracic and first lumbar nerves to provide sensory innervation to the hypogastrium and lower abdominal wall. The iliohypogastric nerve runs parallel to the 12th thoracic nerve to pierce the transverses abdominis muscle near the iliac crest.

After coursing between the transversus abdominis muscle and internal oblique for a short distance, the nerve pierces the latter to travel under the external oblique fascia toward the external inguinal ring. It emerges through the superior crus of the external inguinal ring to provide sensory innervation to the anterior abdominal wall in the hypogastrium. The ilioinguinal nerve courses parallel to the iliohypogastric nerve, but closer to the inguinal ligament. Unlike the iliohypogastric nerve, the ilioinguinal nerve courses with the spermatic cord to emerge from the external inguinal ring, with its terminal branches providing sensory innervations to the skin of the inguinal region and scrotum or labium.

ABNORMALITIES OF THE ABDOMINAL WALL

These can be congenital or acquired.

Congenital Abnormalities

Umbilical Hernias

Umbilical hernias may be classified into three distinct forms:

1. Omphalocele and gastroschisis
2. Infantile umbilical hernia
3. Acquired umbilical hernia

Omphalocele

An omphalocele is a funnel-shaped defect in the central abdomen through which the viscera protrude into the base of the umbilical cord. It is caused by failure of the abdominal wall musculature to unite in the midline during fetal development. The umbilical vessels may be splayed over the viscera or pushed to one side. In larger defects, the liver and spleen may lie within the cord, along with a major portion of the bowel. There is no skin covering these defects, only peritoneum and, more superficially, amnion. Of infants who are born with an omphalocele, 50% to 60% will have concomitant congenital anomalies of the skeleton, gastrointestinal (GI) tract, and nervous, genitourinary, and cardiopulmonary systems.

Infantile Umbilical Hernia

Infantile umbilical hernias appear within a few days or weeks after the stump of the umbilical cord has sloughed. It is caused by a weakness in the adhesion between the scarred remnants of the umbilical cord and mbilical ring.

In contrast to omphalocele, the infantile umbilical hernia is covered by skin. Generally, these small hernias occur in the superior margin of the umbilical ring. They are easily reducible and become prominent when the infant cries. Most of these hernias resolve within the first 24 months of life, and complications such as strangulation are rare. Operative repair is indicated for those children in whom the hernia persists beyond the age of 3 or 4 years.

Acquired Umbilical Hernia

In this condition, an umbilical hernia develops at a time remote from closure of the umbilical ring. This hernia occurs most commonly at the upper margin of the umbilicus and results from weakening of the cicatricial tissue that normally closes the umbilical ring. This may be caused by excessive stretching of the abdominal wall, which may occur with pregnancy, vigorous labor, or ascites. In contrast to infantile umbilical hernias, acquired umbilical hernias do not spontaneously resolve but gradually increase in size. The dense fibrous ring at the neck of this hernia

makes strangulation of herniated intestine or omentum an important complication.

Acquired Abnormalities

Diastasis Recti

Diastasis recti refers to a thinning of the linea alba in the epigastrium and is manifested as a smooth midline protrusion of the anterior abdominal wall. The transversalis fascia is intact, and hence this is not a hernia. There are no identifiable fascial margins and no risk for intestinal strangulation. The presence of diastasis recti may be particularly noticeable to the patient on straining or when lifting the head from the pillow. Appropriate treatment consists of reassurance of the patient and family regarding the innocuous nature of this condition.

ABNORMALITIES OF THE ABDOMINAL WALL

ABDOMINAL WALL HERNIAS

More than 600,000 hernias are repaired annually in the United States, making hernia repair one of the most common operations performed by general surgeons. Despite the frequency of this procedure, no surgeon has ideal results, and complications such as postoperative pain, nerve injury, infection, and recurrence remain.

Hernia is derived from the Latin word for rupture. A hernia is defined as an abnormal protrusion of an organ or tissue through a defect in its surrounding walls.

Although a hernia can occur at various sites of the body, these defects most commonly involve the abdominal wall, particularly the inguinal region.

Abdominal wall hernias occur only at sites at which the aponeurosis and fascia are not covered by striated muscle. These sites most commonly include the inguinal, femoral, and umbilical areas, linea alba, lower portion of the semilunar line, and sites of prior incisions.

The so-called neck or orifice of a hernia is located at the innermost musculoaponeurotic layer, whereas the hernia sac is lined by peritoneum and protrudes from the neck. There is no consistent relationship between the area of a hernia defect and the size of a hernia sac.

A hernia is reducible when its contents can be replaced within the surrounding musculature, and it is irreducible or incarcerated when it cannot be reduced.

A strangulated hernia has compromised blood supply to its contents, which is a serious and potentially fatal complication. Strangulation occurs more often in large hernias that have small orifices. In

this situation, the small neck of the hernia obstructs arterial blood flow, venous drainage, or both to the contents of the hernia sac. Adhesions between the contents of the hernia and peritoneal lining of the sac can provide a tethering point that entraps the hernia contents and predisposes to intestinal obstruction and strangulation.

An external hernia protrudes through all layers of the abdominal wall, whereas an internal hernia is a protrusion of intestine through a defect in the peritoneal cavity.

An interparietal hernia occurs when the hernia sac is contained within a musculoaponeurotic layer of the abdominal wall.

VENTRAL HERNIAS

INTRODUCTION

A ventral hernia is defined by a protrusion through the anterior abdominal wall fascia. These defects can be categorized as spontaneous or acquired or by their location on the abdominal wall.

Epigastric hernias occur from the xiphoid process to the umbilicus, Umbilical hernias occur at the umbilicus, and Hypogastric hernias are rare spontaneous hernias that occur below the umbilicus in the midline. Acquired hernias typically occur after surgical incisions and are termed *Incisional hernias.*

INCIDENCE

Based on National operative statistics, Incisional hernias (IH) accounts for 15% to 20% of all abdominal wall hernias , Umbilical and Epigastric hernias(EH) constitute 10% of hernias. Incisional hernias are twice as common in women as in men.

As a result of the almost 4 million laparotomies performed annually in the United States and the 2% to 30% incidence of incisional hernia, almost 150,000 ventral hernia repairs are performed each year. Several technical and patient-related factors have been linked to the occurrence of incisional hernias.

There is no conclusive evidence that demonstrates that the type of suture at the primary operation affects hernia formation.

Patient-related factors linked to ventral hernia formation include obesity, older age, male gender, sleep apnea, emphysema, and prostatism. It has been proposed that the same factors associated with

destruction of the collagen in the lung result in poor wound healing, with increased hernia formation.

Wound infection has been linked to hernia formation.Whether the type of initial abdominal incision influences the incisional hernia rate remains controversial. As noted, the incidence of ventral herniation after midline laparotomy ranges from 3% to 20% and doubles if the operation is associated with a surgical site infection.

A meta-analysis of 11 studies examining the incidence of ventral hernia formation after various types of abdominal incisions has concluded that the risk is 10.5% for midline, 7.5% for transverse, and 2.5% for paramedian incisions. A recently published prospective randomized trial has reported no difference in hernia formation when comparing midline versus transverse incisions after 1 year, but noted a higher wound infection rate in the transverse incisions. Given the likely similar rates of incisional hernia formation after transverse and midline incisions, the surgeon should plan the incision based on the operative exposure desired to complete the procedure safely.

Few data are available about the natural history of untreated ventral hernias. As noted, asymptomatic or minimally symptomatic inguinal hernias purposely observed over 2 years have a low incidence of complications. Whether this paradigm applies for

asymptomatic ventral or incisional hernias is unclear. Because there is no prospective cohort available to determine the natural history of untreated ventral hernias, most surgeons recommend that these hernias should be repaired when discovered.

DIAGNOSIS

The evaluation of abdominal wall hernias requires diligent physical examination. The anteriorabdominal wall is evaluated with the patient in standing and supine positions, and a Valsalva maneuver is also useful to demonstrate the site and size of a hernia. Imaging modalities may play a greater role in the diagnosis of more unusual hernias of the abdominal wall.

CLASSIFICATION

UMBILICAL HERNIA

The umbilicus represents a midline opening in the linea alba. Umbilical hernia occurs when the umbilical scar closes incompletely in the child or fails and stretches in later years in the adult patient. The hernia becomes readily apparent once the abdominal contents move through the umbilical opening given the relative lack of soft tissue in the anterior body wall at the site of the umbilicus.

History

Umbilical hernias have been documented throughout history with the first references dating back to the ancient Egyptians with the first known record of a surgical repair by Celsus in the first century AD. Mayo in 1901 reported the first series of patients to undergo the classic overlapping fascia operation through a transverse umbilical incision using nonabsorbable suture.

Incidence

Estimates of umbilical hernia present at birth have a wide range. In Caucasian babies, the incidence has been reported at 30%, although for unknown reasons it may be several times greater in African-American children. Umbilical hernia is even more common in premature infants of all races and there is a tendency for familial inheritance.

The majority of congenital pediatric umbilical hernias are known to close over time, as the infant becomes a child. In this way, by school age, only 10% of umbilical hernias remain open on physical examination. Umbilical hernia repair in the child is therefore rarely

performed electively before the age of 2 years, and incarceration in the child is rare. Current recommendations in the pediatric surgical literature advise the delay of umbilical hernia repair until at least 2 -3 years of age given the likelihood that most umbilical hernias will spontaneously close in the young child.

The incidence of umbilical hernia in the adult is largely unknown but most cases are thought to be acquired rather than congenital. It is known to occur more commonly in adult females with a female:male ratio of 3:1. Umbilical hernia is also more commonly found in association with processes that increase intra-abdominal pressure, such as pregnancy, obesity, ascites, persistent or repetitive abdominal distention in bowel obstruction, or peritoneal dialysis.

The etiology of umbilical hernia in the adult may be multifactorial, with increased intra-abdominal pressure working against a weak or incomplete umbilical scar.

At birth, when the umbilical cord is manually ligated, the umbilical arteries and vein thrombose and the umbilical aperture closes. Any defect in the process of umbilical closure will result in an umbilical hernia through which omentum or bowel can herniate.

Clinical Manifestations

The diagnosis of umbilical hernia is not difficult to make. The condition presents with a soft bulge located anterior or adjacent to the umbilicus. In most cases, the bulge will be readily reducible so that the actual fascial defect can be easily defined by palpation. The patient may provide a history of vague abdominal pain associated with herniation and reduction. The list of differential diagnoses is short and includes abdominal wall varices associated with advanced cirrhosis, umbilical granulomas, and metastatic tumor implants in the umbilical soft tissue - Sister Joseph node. In clinical practice, there is usually little doubt as to the diagnosis of umbilical hernia on physical exam.

While the majority of umbilical hernias will close spontaneously in the infant, the clinical spectrum varies widely in the adult. The hernia in the adult is often symptomatic and does not show a tendency to close without intervention. As the hernia contents increase in size, the overlying umbilical skin may become thin and ultimately ulcerated by pressure necrosis.

The umbilical hernia with incarcerated omentum may present with significant tenderness on exam, despite the fact that bowel integrity is not at risk. Alternatively, an umbilical hernia may be found incidentally in the adult on physical exam. This hernia is usually small and any hernia contents are usually readily reducible. The small,asymptomatic,

reducible hernia in the adult can be observed without the need for immediate intervention.

Patients with umbilical hernia secondary to chronic, massive ascites require special consideration. The repair of such hernias is associated with significantly increased morbidity and mortality. Fluid shifts leading to hemodynamic instability, infection, electrolyte imbalance, and blood loss are all considerable risks for the patient in this clinical scenario. Umbilical hernia recurrence is also common in this setting given the persistently increased intra-abdominal pressure. Thus, hernia repair in this population should be reserved for those with progressively symptomatic or incarcerated umbilical hernias.

Treatment

In patient with a small umbilical hernia, a short curvilinear (smile) incision is made just inferior to the umbilicus in the typical skin crease. A skin flap is then raised cephalad using blunt dissection and low-level electrocautery. Dissection is carried through the subcutaneous tissues and down to the fascial level. The neck of the sac is then encircled with a hemostat. After the sac is dissected free of its umbilical attachments, it can be reduced or inverted completely into the peritoneal cavity or incised to

explore the contents of the hernia sac. In this way, the redundant portion of the sac can be excised using electrocautery.

The fascial defect is then closed transversely with interrupted sutures in a horizontal mattress fashion, and the skin of the umbilicus is tacked to the fascia layer using a single suture. This operation is usually performed under general anesthesia as a day-surgery procedure.

In some patients, most small umbilical hernia repairs are performed using local anesthesia with the possible addition of intravenous sedation. The approach is also through a curvilinear incision, placed transversely on the inferior border of the umbilicus or vertically on one curved edge of the umbilicus . A skin flap is raised to elevate the umbilicus off the hernia sac.

The sac is again dissected free of its fascial attachments to isolate the sac for complete reduction and to allow for an adequate width of fascia for suture closure. The sac contents are then reduced into the abdominal cavity and any excess sac can be excised. The defect is then closed with a strong, nonabsorbable suture (such as 0 polypropylene or nylon), usually in an interrupted fashion.

The fascial edges are approximated through this technique. The traditional "vest-over-pants" technique originated by Mayo

is less commonly utilized since overlapping fascial closures have been shown to weaken the overall wound strength in hernia repair.

In large defects that may close only with a significant degree of tension, a cone of polypropylene mesh can be fitted to fill the umbilical defect in place of a tissue repair. The mesh is then sutured circumferentially to the surrounding umbilical fascia to prevent migration.

EPIGASTRIC HERNIA

An epigastric hernia is a defect in the abdominal wall in the midline junction of the aponeuroses of the abdominal wall musculature from the xiphoid process superiorly to the umbilicus inferiorly. The region of this midline raphe is termed the linea alba, and the rectus muscles are situated just lateral to the linea alba. In this area, there is no muscle layer to protect against herniation of intra-abdominal contents through defects in the midline fascia. A paraumbilical hernia is an epigastric hernia that borders on the umbilicus.

History

The epigastric hernia was first described by Villeneuve in 1285, but the term epigastric hernia was only first used to describe this condition in 1812 by Leville. The first successful repair of an epigastric hernia was reported in 1802 by Maunior.

Incidence

Estimates of the frequency of epigastric hernia in the general population range from 5%. It is most commonly diagnosed in middle age, and congenital epigastric hernias are uncommon. The condition is more common in males by a ratio of 3:1. Twenty percent of epigastric hernias may be multiple, although most are associated with one dominant defect.

Etiology

The cause of epigastric hernia is largely unknown. Since the condition does not predominate in children, it is unlikely that the defect is entirely congenital in origin. Rather, the hernia is likely the result of multiple factors, such as a congenitally weakened linea alba from a lack of decussating midline fibers and subsequent increase in intra-abdominal pressure, surrounding muscle weakness, or chronic abdominal wall strain.

The midline defect is usually elliptical in nature, with the long axis oriented transversely. The width of the defect is generally a few

millimeters to several centimeters, and larger defects are rare. In most cases, the hernia is filled by a small amount of preperitoneal fat only and no peritoneal sac is present.

The hernia will often not be seen on laparoscopy owing to the lack of peritoneal involvement through the hernia defect. Epigastric hernias that involve a peritoneal sac usually contain only omentum and rarely small intestine.

Clinical Manifestations

Epigastric hernia is often asymptomatic and represents a chance finding on physical exam. Patients with symptomatic hernias complain of vague abdominal pain above the umbilicus that is exacerbated with standing or coughing and relieved in the supine position. Severe pain may be secondary to incarceration or strangulation of preperitoneal fat or omentum. Bowel strangulation in epigastric hernias is a rare finding.

On examination, the hernia is diagnosed by palpating a small, soft, reducible mass in the midline superior to the umbilicus. The mass may protrude with a Valsalva maneuver or with standing. Palpation can be especially difficult in the obese patient. Rarely, imaging is needed

to confirm the diagnosis, and computed tomography of the abdomen is the preferred technique.

Treatment

As operative repair of the epigastric hernia can most often be performed as a day-surgery procedure under local anesthesia. General anesthesia should be reserved for the complicated patient, a very large hernia, or the pediatric population.

The herniated contents are exposed through a small midline vertical or transverse incision. The defect in the linea alba and the surrounding fascia are cleared of subcutaneous fat. Effort is made to identify a peritoneal sac protruding through the defect. If identified, a small sac can be simply inverted back within the abdominal cavity. Alternatively, a larger sac can be opened, its contents reduced, and any excess peritoneum excised. It is usually not necessary to perform formal closure of the peritoneal sac. The defect is then closed transversely with a few interrupted sutures of polypropylene or nylon, taking generous bites of surrounding fascia.

SPIGELIAN HERNIA

A spigelian hernia occurs along the semilunar line, which traverses a vertical space along the lateral rectus border from the costal margin to the pubic symphysis. Adriaan van der Spieghel , a pupil of Fabricius of Padua and a professor of anatomy and surgery, was the first to accurately describe the semilunar line. He described the spigelian fascia as the aponeurotic structure between the transversus abdominis muscle laterally and the posterior rectus sheath medially. This fascia is what makes up the semilunar line, and it is through this fascial layer that a spigelian hernia forms.

Treatment

The treatment for spigelian hernia is operative repair once the diagnosis has been confirmed, given the risk for incarceration. This is usually performed under general anesthesia given the need for splitting of the external oblique muscle.

A transverse incision is made directly over the palpable mass or fascial defect. A hernia in the subcutaneous space will reveal itself immediately, and an interparietal hernia will require further dissection. In this way, the external oblique fascia is incised and the external oblique muscle is split to identify the sac posterior to the muscle.

The sac is freed from its surrounding attachments until the neck is isolated. The sac is opened, the intra-abdominal contents reduced, and the sac is either excised if sizable or simply inverted into the intra-abdominal cavity. Suturing the medial and lateral edges of the internal oblique and transversus abdominis aponeuroses closes the fascial defect. Essentially, this approximates the internal oblique and transversus fascia laterally to the rectus sheath medially. Prosthetic mesh is not required for this repair, although the use of mesh plugs to close the hernia defect has been described. Recurrence is uncommon and the operation is usually well tolerated.

INCISIONAL HERNIA

Of all hernias encountered, incisional hernias can be the most frustrating and difficult to treat. Incisional hernias occur as a result of excessive tension and inadequate healing of a previous incision, which may be associated with surgical site infection. These hernias enlarge over time, leading to pain, bowel obstruction, incarceration, and strangulation. Obesity, advanced age, malnutrition, ascites, pregnancy, and conditions that increase intra-abdominal pressure are factors that predispose to the development of an incisional hernia. Obesity can cause an incisional hernia to occur because of increased tension on the

abdominal wall from the excessive bulk of a thick pannus and large omental mass. Chronic pulmonary disease and diabetes mellitus have also been recognized as risk factors for the development of incisional hernia. Medications such as corticosteroids and chemotherapeutic agents and surgical site infection can contribute to poor wound healing and increase the risk for developing an incisional hernia.

Large hernias can result in loss of abdominal domain, which occurs when the abdominal contents no longer reside in the abdominal cavity. These large abdominal wall defects also can result from the inability to close the abdomen primarily because of bowel edema, abdominal packing, peritonitis, and repeat laparotomy. With loss of domain, the natural rigidity of the abdominal wall becomes compromised and the abdominal musculature is often retracted. Respiratory dysfunction can occur because these large ventral defects cause paradoxical respiratory abdominal motion. Loss of abdominal domain can also result in bowel edema, stasis of the splanchnic venous system, urinary retention, and constipation. Return of displaced viscera to the abdominal cavity during repair may lead to increased abdominal pressure, abdominal compartment syndrome, and acute respiratory failure.

TREATMENT

OPERATIVE REPAIR

Primary repair of incisional hernias can be done when the defect is small ≤2 to 3 cm in diameter and there is viable surrounding tissue, or in cases in which the hernia was clearly a result of a technical error at the initial operation, such as a suture fracturing.

Larger defects >2 to 3 cm in diameter have a high recurrence rate if closed primarily and are repaired with a prosthesis. Recurrence rates vary between 10% and 50% and are typically reduced by more than 50% with the use of prosthetic mesh. Prosthetic material may be placed as an onlay patch to buttress a tissue repair, interposed between the fascial defect, sandwiched between tissue planes, or put in a sublay position. Depending on its location, several important properties of the mesh must be considered.

PROSTHETIC MATERIALS FOR VENTRAL HERNIA REPAIR

SYNTHETIC MATERIALS

Various synthetic mesh products are available. Desirable characteristics of a synthetic mesh include being chemically inert, resistant to mechanical stress while maintaining compliance, sterilizable, noncarcinogenic, inciting minimal inflammatory reaction, and hypoallergenic. The ideal mesh has yet to be defined. When selecting the appropriate mesh, the surgeon must consider the position of the mesh, whether it will be in direct contact with the viscera, and the presence or

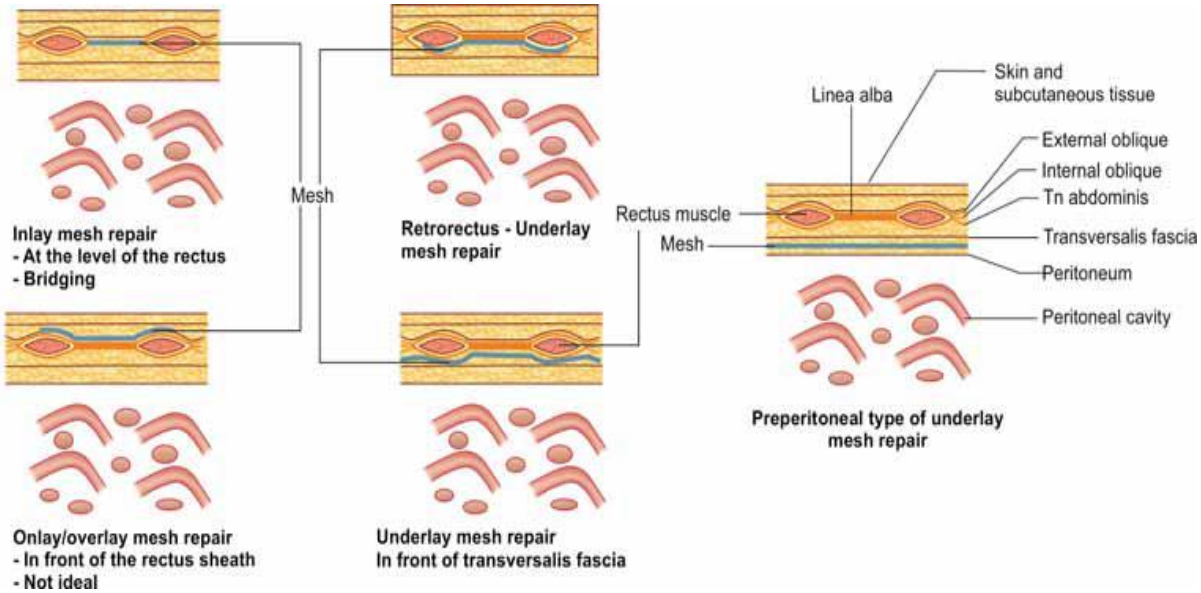
risk of infection. Mesh constructs can be classified based on weight of the material, pore size, water angle hydrophobic or hydrophilic, and whether there is an antiadhesive barrier present.

When placing a mesh in the extraperitoneal position without the risk of bowel erosion, a macroporous unprotected mesh is appropriate. Both polypropylene and polyester mesh have been successfully placed in the extraperitoneal position. Polypropylene mesh is a hydrophobic macroporous mesh that allows for the ingrowth of native fibroblasts and incorporation into the surrounding fascia. It is semirigid, somewhat flexible, and porous. Placing polypropylene mesh in an intraperitoneal position directly apposed to the bowel is avoided because of unacceptable rates of enterocutaneous fistula formation.

Recently lighter weight polypropylene mesh has been introduced to address some of the long-term complications of heavyweight polypropylene mesh. The definition of lightweight mesh was arbitrarily chosen at less than 50 g/m2, with heavyweight mesh weighing more than 80 g/m2. These lightweight mesh products often have an absorbable component of material that provides initial handling stability, typically composed of Vicryl - polyglactin 910 or Monocryl - poliglecaprone 25.

Whether lightweight mesh results in improved patient outcomes is controversial. In a randomized controlled trial evaluating lightweight versus heavy weight polypropylene mesh for ventral hernia repair, the recurrence rate was more than twice that in the lightweight group 17% versus 7%for heavyweight mesh.

Polyester mesh is composed of polyethylene terephthalate and is a hydrophilic, heavyweight, macroporous mesh. This mesh has several different weaves that can yield a two-dimensional flat screen–like mesh and a three-dimensional multifilament weave. Unprotected polyester mesh should not be placed directly on the viscera because unacceptable rates of erosion and bowel obstruction have been reported. When placed in the preperitoneal position in complex ventral hernia repairs, complication rates are low.



Mesh placement –various methods

When placing mesh in an intraperitoneal position, several options are available. A single sheet of mesh with both sides constructed to reduce adhesions, or a composite-type mesh with one side made to promote tissue ingrowth and the other to resist adhesion formation, are available. Single-sheet mesh is composed of expanded PTFE - polytetrafluoroethylene.

This prosthetic has a visceral side that is microporous (3 microns) and an abdominal wall side that is macroporous (17 to 22microns) and promotes tissue ingrowth. This product differs from other synthetic meshes in that it is flexible and smooth. Some fibroblast proliferation occurs through the pores, but PTFE is impermeable to fluid. Unlike polypropylene, PTFE is not incorporated into the native tissue. Encapsulation occurs slowly and infection can occur during the encapsulation process. When infected, PTFE almost always must be removed.

To promote better tissue integration, composite mesh was developed. This product combines the attributes of polypropylene and PTFE by layering the two substances on top of one another. The PTFE surface serves as a permanent protective interface against the bowel and

the polypropylene side faces superficially, to be incorporated into the native fascial tissue.

These materials have variable rates of contraction and, when placed together, can result in buckling of the mesh and visceral exposure to the polypropylene component.

Recently, other composite meshes have been developed that combine a macroporous mesh with a temporary, absorbable antiadhesive barrier. Basic constructs of these mesh materials include heavyweight or lightweight polypropylene, or polyester. Absorbable barriers are typically composed of oxidized regenerated cellulose, omega-3 fatty acids, or collagen hydrogels. A number of small animal studies have validated the antiadhesive properties of these barriers.

BIOLOGIC MATERIALS

The newest development in prostheses for ventral hernia repair is nonsynthetic or natural tissue mesh. There are numerous biologic grafts available for abdominal wall reconstruction . These products can be categorized based on the source material (e.g., human, porcine, bovine), postharvesting processing techniques (e.g., cross-linked, non-cross-linked) and sterilization techniques (e.g., gamma radiation, ethylene oxide gas sterilization, nonsterilized).

These products are largely composed of acellular collagen and theoretically provide a matrix for neovascularization and native collagen deposition. These properties provide distinct advantages in infected or contaminated cases in which synthetic mesh is thought to be contraindicated. Ideal placement techniques are yet to be defined for these relatively new products; however, some general principles apply. These products function best when used as a fascial reinforcement rather than as a bridge or interposition repair. Unfortunately, the long-term durability of biologic mesh is currently unknown. There are no data comparing the effectiveness of these natural tissue alternatives with that of synthetic mesh repairs.

OPERATIVE TECHNIQUES

VENTRAL HERNIA

It is generally agreed that all but the smallest incisional hernias can be repaired with mesh, and the surgeon has various options for placing the mesh.

OPEN ONLAY MESH REPAIR

The onlay technique involves primary closure of the fascia defect and placement of a mesh over the anterior fascia.

The major advantage of this approach is that the mesh is placed outside the abdominal cavity, avoiding direct interaction with the abdominal viscera.

However, disadvantages include the large subcutaneous dissection, increased likelihood of seroma formation, superficial location of the mesh, which places it in jeopardy of contamination if the incision becomes infected, and the repair is usually under tension. Prospective analysis of this technique is not available, but a retrospective review has reported recurrence rates of 28%.

Interposition prosthetic repairs involve securing the mesh to the fascial edge without overlap. This results in a predictably high recurrence rate because the synthetic often pulls away from the fascial edge because of increased intra-abdominal pressure. A sublay or underlay technique involves placing the prosthetic below the fascial components. The mesh can be placed intraperitoneally, preperitoneally, or in the retrorectus (retromuscular) space. It is highly desirable to have the mesh placed beneath the fascia. With a wide overlap of mesh and fascia, the natural forces of the abdominal cavity act to hold the mesh in place and prevent migration. This can be accomplished using several techniques

INTRAPERITONEAL MESH PLACEMENT

After reopening the prior incision, and with the use of available dual-type mesh or composite mesh, the mesh can be placed in an intraperitoneal position at least 4 cm beyond the fascial margin and secured with interrupted mattress sutures. This technique requires raising subcutaneous flaps and the mesh may be in direct contact with the abdominal contents.

The laparoscopic approach for ventral hernia repair relies on the same principles as the retrorectus repair; however, the mesh is placed within the peritoneal cavity. This repair is useful, particularly for large defects. Trocars are placed as far laterally as feasible based on the size and location of the hernia. The hernia contents are reduced and adhesions are lysed. The surface area of the defect is measured, and a barrier-coated mesh is fashioned with at least 5 cm of overlap around the defect. The mesh is rolled, placed into the abdomen, and deployed. It is secured to the anterior abdominal wall with preplaced mattress sutures that are passed through separate incisions; tacking staples are placed between these sutures to secure the mesh 5 cm beyond the defect. The advantage of this approach is a quicker recovery time. There are fewer incisional complications with the laparoscopic approach because large incisions and subcutaneous undermining are avoided.

RETROMUSCULAR MESH PLACEMENT

This technique involves placing prosthetic mesh in the extraperitoneal position in the preperitoneal space or retrorectus position. This technique was initially described by Stoppa. A large piece of mesh is placed in the retromuscular space on top of the posterior rectus sheath or peritoneum. This space must be dissected laterally on both sides of the linea alba to a distance of 8 to 10 cm beyond the defect. The prosthetic mesh extends 5 to 6 cm beyond the superior and inferior borders of the defect. With smaller defects, the mesh does not need to be sutured because it is held in place by intraabdominal pressure (Pascal's principle), allowing eventual incorporation into the surrounding tissues. Alternatively, in larger defects, the mesh can be secured laterally with several sutures. This approach avoids contact between the mesh and abdominal viscera and has been shown in long-term studies to have a respectable recurrence rate - 14% in large incisional hernias. The retrorectus space is bordered laterally by the linea semilunaris. In very large hernias or in those patients with atrophic rectus muscles, this might prevent adequate mesh overlap. Alternatively, the preperitoneal plane can be accessed by incising the posterior rectus sheath approximately 1 cm medial to the linea semilunaris. Once the preperitoneal space is accessed, the dissection can be carried laterally to the psoas muscle, if necessary. Very large sheets of prosthetic

mesh can be placed in this location with wide defect coverage. A retrospective review from the Mayo Clinic, with a median follow-up of 5 years, has documented a 5% overall hernia recurrence rate in 254 patients who underwent complex ventral hernia repair over a 13-year period.

COMPONENT SEPARATION

Another option for the repair of complex or large ventral defects is the component separation technique. This involves separating the lateral muscular layers of the abdominal wall to allow their advancement. Primary fascial closure at the midline is often possible. The procedure is performed by raising large subcutaneous flaps above the external oblique fascia. These flaps are carried laterally past the linea semilunaris. This dissection itself can provide some advancement of the abdominal wall. Large perforating subcutaneous vessels can be preserved to prevent ischemic necrosis of the skin flaps.

A relaxing incision is made 2 cm lateral to the linea semilunaris on the lateral external oblique aponeurosis from several centimetres above the costal margin to the pubis. The external oblique is then bluntly separated in the avascular plane, away from the internal oblique, allowing its advancement. Further relaxing incisions have been described to the aponeurotic layers of the internal oblique or transversus

abdominis but this can result in problematic lateral bulges or herniation at this site. Additional release can be safely achieved by incising the posterior rectus sheath. These techniques, when applied to both sides of the abdominal wall, can yield up to 20 cm of mobilization.

Although this technique often allows tension-free closure of these large defects, recurrence rates as low as 20% have been reported with the use of prosthetic reinforcement in large hernias. It is important that patients understand that a lateral bulge can occur after releasing the external oblique aponeurosis. Recognizing the high recurrence rates with component separation alone, several authors have reported small series of biologic mesh reinforcement of these repairs. To date, no randomized controlled trials have supported a lower recurrence rate with biologic prosthetic reinforcement. If a bioprosthetic is placed, it can be secured with an underlay or onlay technique. No comparative data exist demonstrating the superiority of either repair technique.

ENDOSCOPIC COMPONENT SEPARATION

One of the major limitations of open component separation is that large skin flaps are necessary to access the lateral abdominal wall musculature. Recognizing these limitations, innovative, minimally invasive approaches to component separation have been described.

The basic principle of a minimally invasive component separation is to gain direct access to the lateral abdominal wall without creating a lipocutaneous flap. Typically, this is performed by a direct cut down through a 1-cm incision off the tip of the 11th rib overlying the external oblique muscle. The external oblique is split in the line of its fibers and a standard bilateral inguinal hernia balloon dissector is placed in between the external and internal oblique muscles, toward the pubis.

Three laparoscopic trocars are placed in the space created and the dissection is carried from the pubis to several centimeters above the costal margin. The linea semilunaris is carefully identified and the external oblique is incised from beneath the muscle, at least 2 cm lateral to the linea semilunaris. The muscle is released from the pubis to several centimeters above the costal margin. This procedure is performed bilaterally. Synthetic or biologic mesh can be used to reinforce the repair of the midline closure. These relatively new techniques are feasible, but long-term data demonstrating equivalency to open techniques are lacking.

RESULTS OF VENTRAL HERNIA REPAIRS

Several prospective randomized trials have compared laparoscopic and open ventral hernia repairs. Although most of these studies were small, with fewer than 100 patients, the results tend to favor a laparoscopic approach.

The incidences of postoperative complications and recurrence were less in hernias repaired laparoscopically. Several retrospective reports have demonstrated similar advantages for a laparoscopic approach. Based on the comparative trials listed laparoscopic incisional hernia repair results in fewer postoperative complications, lower infection rate, and decreased hernia recurrence.

COMPLICATIONS

Mesh Infection

Mesh infections are serious complications that can be difficult to treat. If ePTFE becomes infected, it requires removal with the resultant morbidity of another defect, which often must be closed under tension, leading to inevitable recurrence. In open ventral hernia repair, incisional and mesh infections are not infrequent. Using the laparoscopic technique and placing a large piece of mesh without undermining large subcutaneous tissue flaps avoids wound complications. In a series of almost 1000 patients who had laparoscopic ventral hernia repair, mesh infections occurred in less than 1% of cases. Perhaps the greatest advantage of the laparoscopic approach for repairing ventral hernias is this reduction in infectious complications.

Seromas

Seroma formation can occur after laparoscopic and open ventral hernia repair. In open ventral hernia repair, drains are often placed in an attempt to obliterate the dead space caused by the hernia and tissue dissection. These drains can cause mesh contamination and seromas can form after drain removal. With laparoscopic repair, the hernia sac is not resected and a seroma cavity will result. Most of these seromas will resolve over time as the mesh becomes incorporated on the hernia sac. Preoperative discussions with the patient describing the expectations of a temporary seroma are imperative before laparoscopic ventral hernia repair. We reserve aspiration for symptomatic or persistent seromas after 6 to 8 weeks.

Enterotomy

Intestinal injury during adhesiolysis can be catastrophic. Management of an enterotomy during a hernia repair is controversial and depends on the segment of intestine injured (small versus large bowel) and amount of spillage. Options include aborting the hernia repair, using a primary tissue or biologic tissue repair, and performing a delayed repair using prosthetic mesh in 3 to 4 days. When there is gross contamination, the use of synthetic mesh is contraindicated.

MATERIALS AND METHODS

This study which is prospective involved 55 patients with ventral hernia, that presented during the period of june 2016 year to august 2017 year, for a period of 15 months admitted to a single surgical unit at Goverment Rajaji Hospital, Madurai, India.

Patients were subjected to either repair by open or laparoscopy and were followed for a period of upto one year from the date of surgery.

STUDY CRITERIA

Inclusion criteria were :

1. Patients more than 25 years of age group in both sexes presenting with ventral hernia
2. Hernia diameter between 3 and 15 cm , location at ventral abdominal wall
3. Patients consented for inclusion in the study,according to the designated proforma.

Exclusion criteria:

1. Patients less than 25 years of age.
2. Hernia size less than 3 cm and more than 15 cm.

3. Obese patients.
4. Patients with recurrent hernias, obstructed and strangulated hernias.
5. Patients with comorbidities like diabetes , heart disease ,ascites , bleeding disorder. patient not consented for inclusion in the study.

In our study out of 55 patients , 35 patients underwent open onlay mesh repair and 20 patients underwent laparoscopic intraperitoneal mesh repair for various types of ventral hernia.

Patients in both groups were comparable in respect to age.

The objective of the study is to compare laparoscopic versus open ventral hernia repair with regard to postoperative pain,operative results, perioperative and postoperative complications, hospital admission and duration of stay, and return to work.

All patients underwent routine laboratory investigations (complete blood count , blood serum chemistries, chest x-ray ,ECG , and high resolution ultrasound of anterior abdominal wall to know the defect size.

SURGICAL TECHNIQUE

OPEN ONLAY MESH REPAIR

After taking patients to operation theatre and under general anesthesia , endotracheal intubation and close monitoring the operation was done. Foleys catheter was put for patients with lower andominal ventral hernia repair and nasogastric tube for upper abdominal hernia repair with perioperative single dose antibiotic inj.cfotaxime 1gm iv administerd.

Then after proper cleaning, painting ,draping ofthe abdomen, the skin incision was made according to the site and size of defect ,subcutaneous flaps raised upto 5cm around the defect and after that hernia sac dissected and opened , the contents reducedinto the abdominal cavity. The defect in the linea alba was closed with nonabsorbable 1-0 prolene suture, and an appropriate size of monofilament polypropylene mesh (Dolphin mesh) of Futura surgicare , was placed over the anterior rectus sheath and fixed with 2-0 Prolene. Hemostasis was achieved and 16 fg Romovac suction drain placed . skin closed with 2-0 Ethilon.

LAPAROSCOPIC REPAIR OF VENTRAL HERNIA

In laparoscopic repair of ventral hernia in all cases bowel was prepared , bladder was catheterised with Foleys , nasogastric tube placed.

After proper cleaning ,painting and draping under general anesthesia , The surgeon stands to the left of the patient ,The monitor was placed opposite to the surgeon and the instrument trolley was towards the leg of the patient. Generally 3 trocars are adequate for small to moderate size hernias. Pneumoperitoneum created through palmers point , 2-3 cm below the left costal marginin the midclavicular line, using open Hassons method. 10mm trocars at the palmers point and other two 5mm trocars at left lumbar and iliac fossa along the anterior axillary line. Adhesions of the abdominal contents to the hernia sac and the surrounding abdominal wall are lysed and the contents of the hernia sac are reduced. Hernia sac is excised, asmuch as possible to avoid seroma formation. Transfascial sutures applied with polypropylene 1-0 sutures with the help of cobbler needle to obliterate the defect after reducing pneumoperitoneum partially. Size of the defect measured and appropriate size of the defect measured and appropriate size of dual mesh (Symbotex composite mesh , covidien)

composed of monofilament polyester with absorbable collagen film and preplaced sutures and marking covering 4cm to 5cm beyond the defect was selected.

Mesh folded like banana leaf and introduced intraperitoneally through 10mm trocar and mesh is unfolded so that white side polyester facing abdominal wall and marked site coated with absorbable collagen film facing viscera. Mesh is fixed transfascially in the middle with sutures provided along with mesh with the help of cobbler needle. Absorbable tackers (Absorba tack) 5mm size used to fix the mesh all around and corners. Hemostasis was achieved before the removal of the trocars. All 10mm trocar fascial defects were closed with 1-0 vicryl and skin with 1-0 vicryl. Catheter and ryles tube removed after extubating the patient .port sites sterile plaster dressing applied. Compressive dressing prepared from gauze is applied over the defect to prevent seroma formation for 5 days.

Patients were followed up one and two weeks after surgery and upto one year.

ANALYSIS:

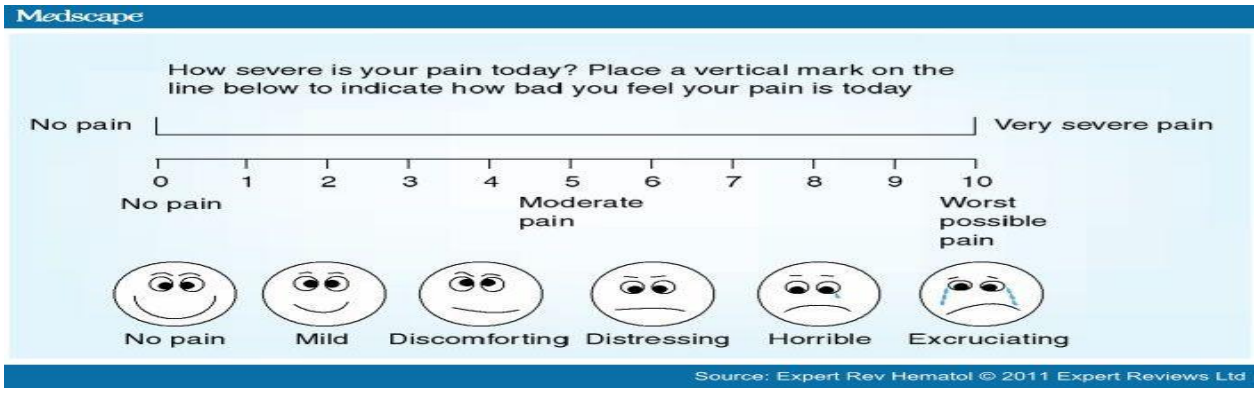
Unpaired students T- test and paired T- test were used to find out statistical significance. A P- value<0.005 was taken as significant.

SPSS VERSION 20 was used for statistical analysis, and following parameters were calculated.

1. The operative time was calculated by measuring time taken from skin incision to skin closure.

2. Postoperative drainage fluid volume was calculated by Romovac suction drain for day 1 , 2,3,5, and 7 days.

3. Post operative pain was calculated by using Visual analogue scale. We calculated pain during initial postoperative day 1 and day 3 and 5th day.



4. Eura HS quality of life scale calculated based on the following parameters and scoring calculated for the same , preoperatively and postoperatively on day 3 and 5 and day 7 and 4th week. Scoring of 0-10 given based on the condition of the patient evaluated.

5. Intraoperative and postoperative outcomes were calculated for Seroma ,Wound infection , Mesh infection and Bowel injury and Recurrence rates.

name of study	
study number	

EuraHS Quality Of Life scale

The EuraHS-QoL scale is a method to measure the quality of life for patients before (pre-operative) and after (postoperativ) an operation of an abdominal wall hernia with or without an implantation of a mesh to repair the defect.
It is a questionnaire developed by the Working Group of the European Registry for Abdominal Wall Hernias (EuraHS).

Please answer all of the 9 following questions in the 3 main fields of:

1. **Pain of the side of the hernia**
2. **Restrictions of activities because of pain or discomfort**
3. **Cosmetic discomfort**

Therefore, please mark a number corresponding to your current state.

Respectively, you will give a 0 (no pain, no restriction and cosmetically beautiful) **for the best conditions and a 10 for the worst state** (worst pain, completely restricted and cosmetically ugly). **If you do not perform one of these asked activities, please mark the X in the last column.**

Personal data:

name	
date of birth	
date of today	
date of operation	

EuraHS

EuraHS QoL

version: english

EuraHS Quality Of Life scale — Preoperative

1. Pain at the site of the hernia												
	0 = no pain										10 = worst pain imaginable	
Pain in rest (lying down)	0	1	2	3	4	5	6	7	8	9	10	
Pain during activities (walking, biking, sports)	0	1	2	3	4	5	6	7	8	9	10	
Pain felt during the last week	0	1	2	3	4	5	6	7	8	9	10	

2. Restrictions of activities because of pain or discomfort at the site of the hernia												
	0 = no restriction										10 = completely restricted	
Restriction from daily activities (inside the house)	0	1	2	3	4	5	6	7	8	9	10	X
Restriction outside the house (walking, biking, driving)	0	1	2	3	4	5	6	7	8	9	10	X
Restriction during sports	0	1	2	3	4	5	6	7	8	9	10	X
Restriction during heavy labour	0	1	2	3	4	5	6	7	8	9	10	X
	X = If you do not perform this activity											

3. Esthetical discomfort												
	0 = very beautiful										10 = extremely ugly	
Shape of your abdomen	0	1	2	3	4	5	6	7	8	9	10	
Site of the hernia	0	1	2	3	4	5	6	7	8	9	10	

EuraHS QoL

version: english

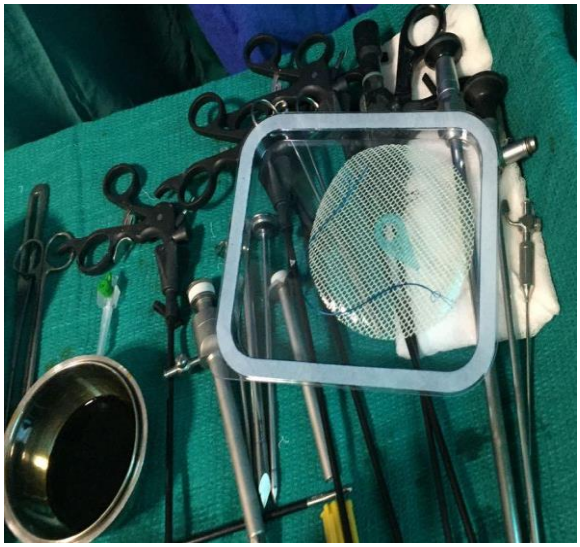
EuraHS Quality Of Life scale Postoperative _____ w/m

1. Pain at the site of the hernia												
	0 = no pain										10 = worst pain imaginable	
Pain in rest (lying down)	0	1	2	3	4	5	6	7	8	9	10	
Pain during activities (walking, biking, sports)	0	1	2	3	4	5	6	7	8	9	10	
Pain felt during the last week	0	1	2	3	4	5	6	7	8	9	10	

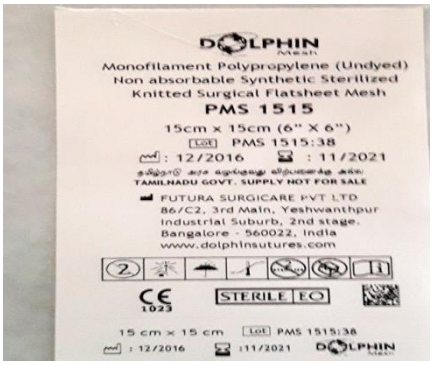
2. Restrictions of activities because of pain or discomfort at the site of the hernia												
	0 = no restriction										10 = completely restricted	
Restriction from daily activities (inside the house)	0	1	2	3	4	5	6	7	8	9	10	X
Restriction outside the house (walking, biking, driving)	0	1	2	3	4	5	6	7	8	9	10	X
Restriction during sports	0	1	2	3	4	5	6	7	8	9	10	X
Restriction during heavy labour	0	1	2	3	4	5	6	7	8	9	10	X
	X = If you do not perform this activity											

3. Esthetical discomfort												
	0 = very beautiful										10 = extremely ugly	
Shape of your abdomen	0	1	2	3	4	5	6	7	8	9	10	
Site of the hernia and the scar	0	1	2	3	4	5	6	7	8	9	10	

1. MATERIALS USED FOR LAP MESH REPAIR



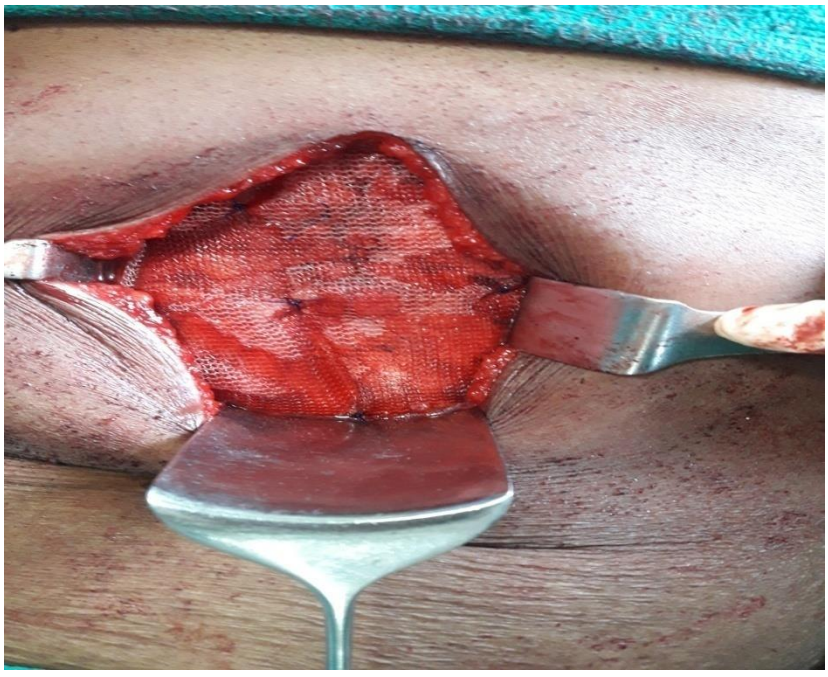
2. MATERIALS USED FOR OPEN MESH REPAIR



3. OPEN ONLAY MESH REPAIR

After rectus sheath closure

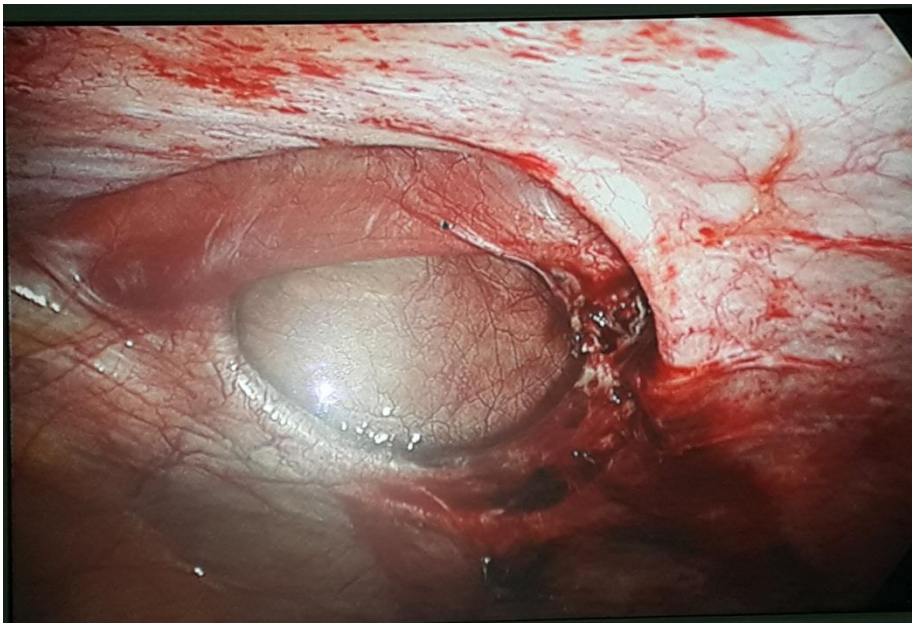
After onlay mesh repair



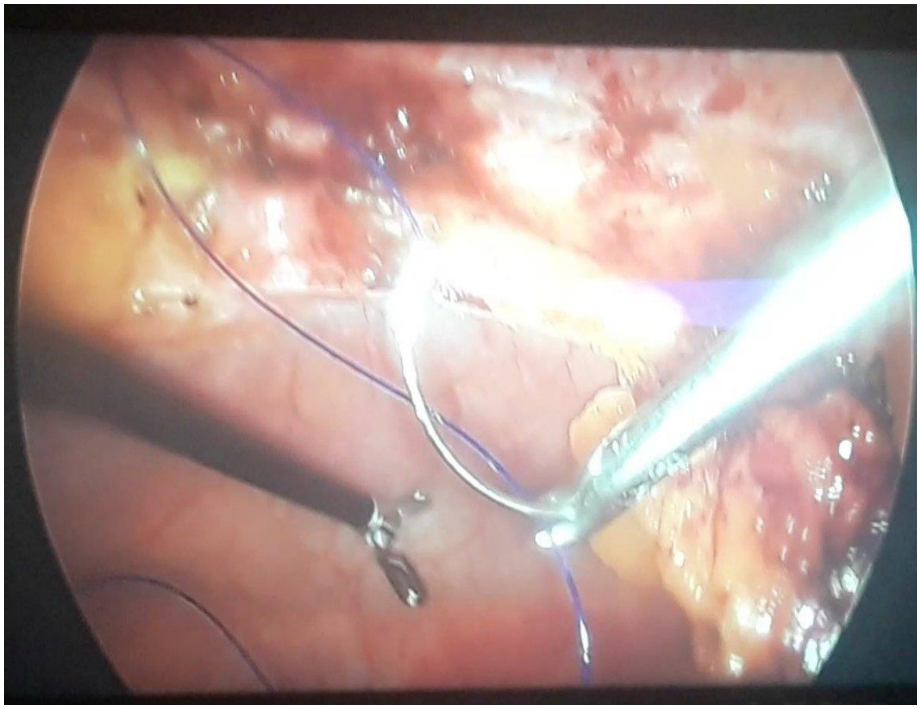
4. LAPAROSCOPIC ONLAY MESH REPAIR

PORTPLACEMENTS

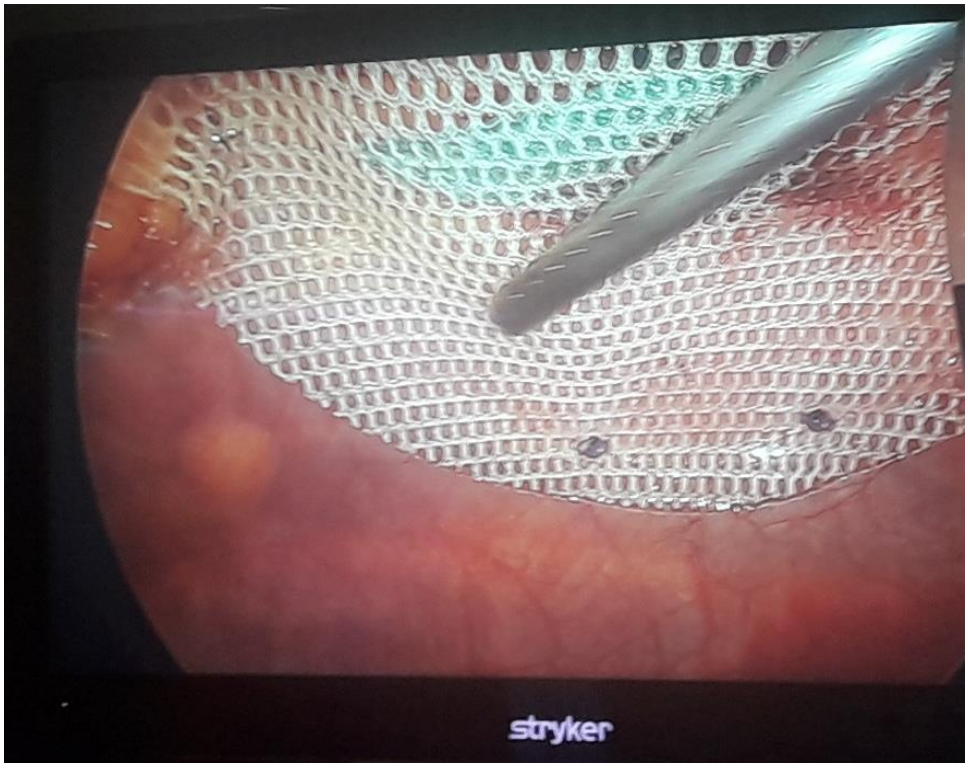
DEFECT SIZE



DEFECT CLOSURE WITH 1-0 PROLENE



IPOM - COMPOSITE MESH – FIXING WITH TACKERS



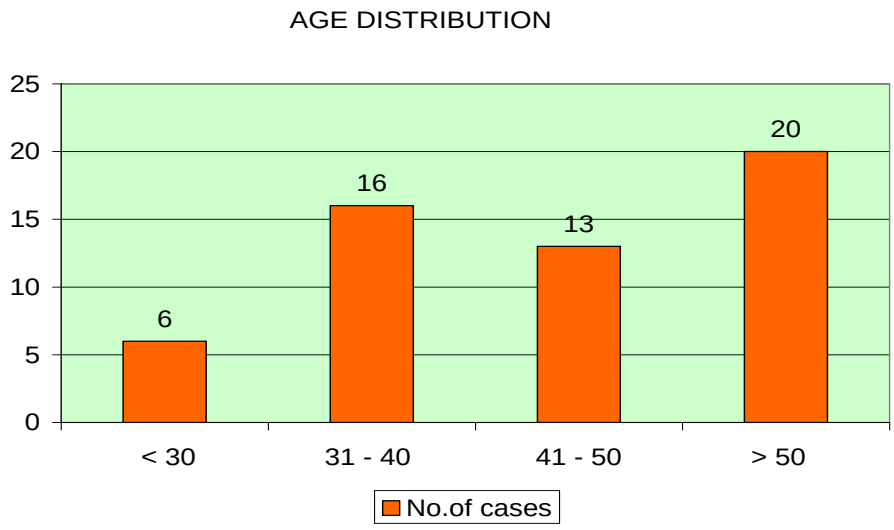
STATISTICAL ANALYSIS

Totally 55 patients underwent laparoscopic and open ventral hernia repair and results analyzed , and following conclusions were drawn.

1. Age wise distribution

Age in years	No.of cases
< 30	6
31 - 40	16
41 - 50	13
> 50	20
Total	55

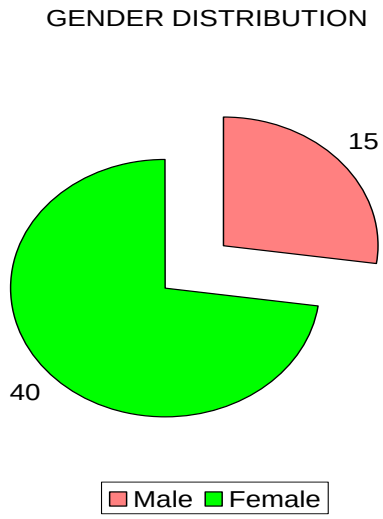
In our study totally 55 pts were studied , out of it 6 pts are age less than 30 years, and 20 of them more than 50 years and others inbetween.



2. Gender wise distribution

Sex	No.of cases
Male	15
Female	40
Total	55

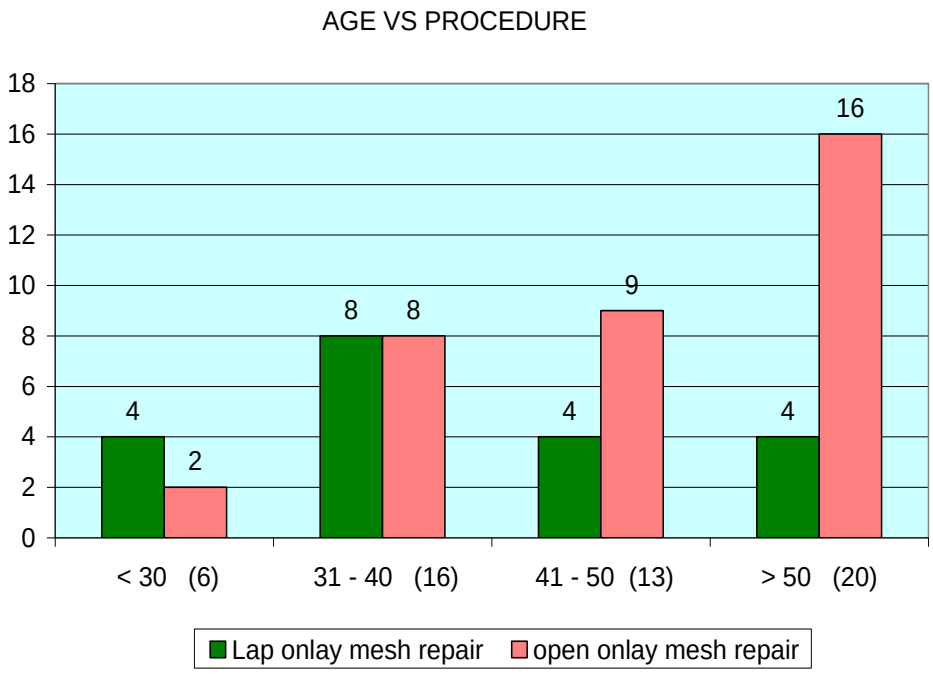
Out of 55 pts 15 male and 40 female pts are selected for our study.



3.Age vs Procedure

Age vs Procedure	Lap onlay mesh repair	open onlay mesh repair
< 30 (6)	4	2
31 - 40 (16)	8	8
41 - 50 (13)	4	9
> 50 (20)	4	16
Total (55)	20	35

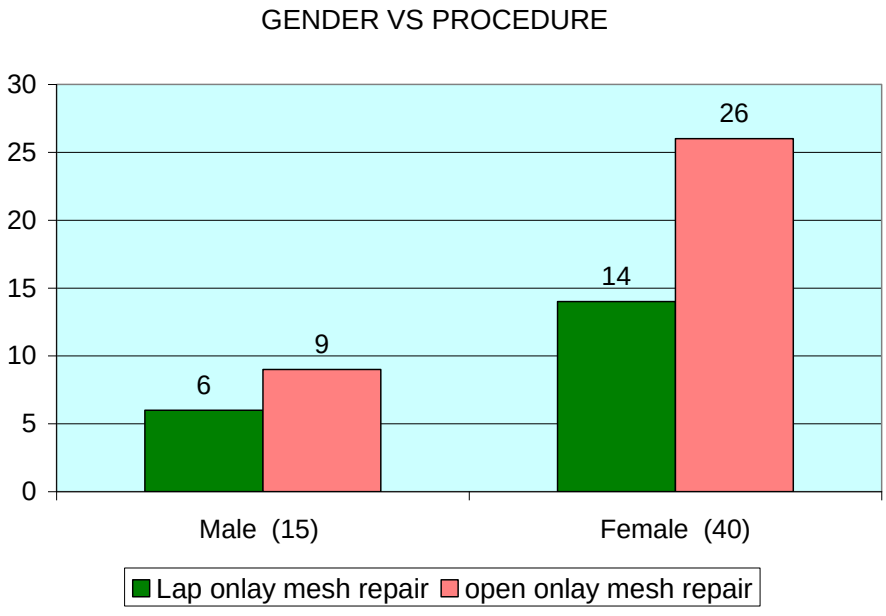
Among < 30 years 4 pts underwent lap and 2 pts underwent open mesh repair. Among >50 years 4 pts underwent lap and 16 pts underwent open mesh repair. In between age group 12 pts underwent lap and 17 pts underwent open repair.



4. Gender vs Procedure

Gender vs Procedure	Lap onlay mesh repair	open onlay mesh repair
Male (15)	6	9
Female (40)	14	26
Total (55)	20	35

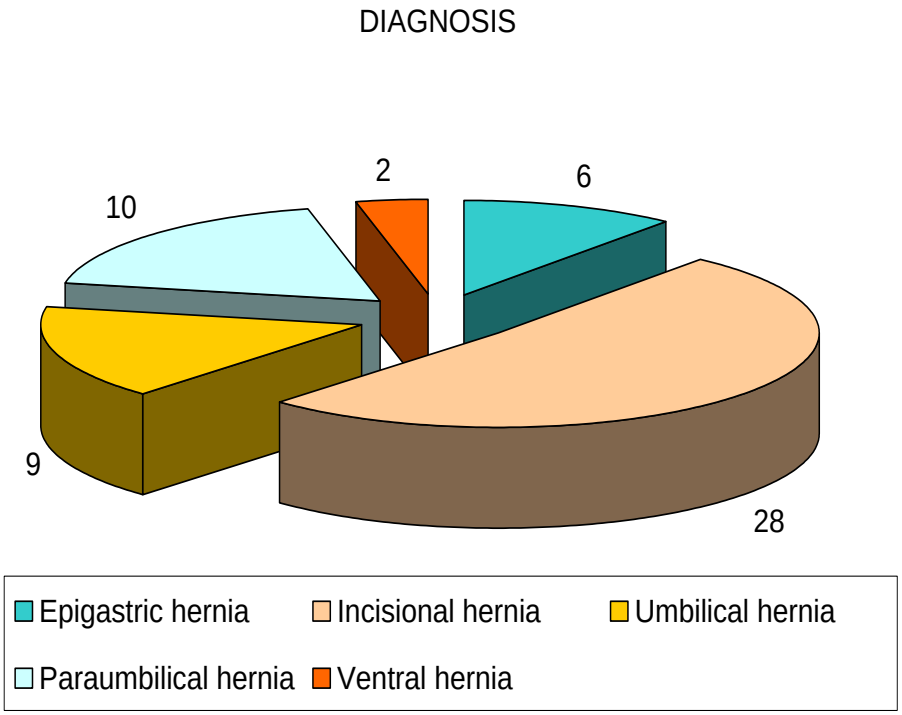
In our study among 15 male pts 6 pts underwent lap and 9 pts underwent open repair. Among 40 female patients 14 pts underwent lap and 26 underwent open repair.



5. Diagnosis and Distribution

Diagnosis	No.of cases
Epigastric hernia	6
Incisional hernia	28
Umbilical hernia	9
Paraumbilical hernia	10
Ventral hernia	2
Total	55

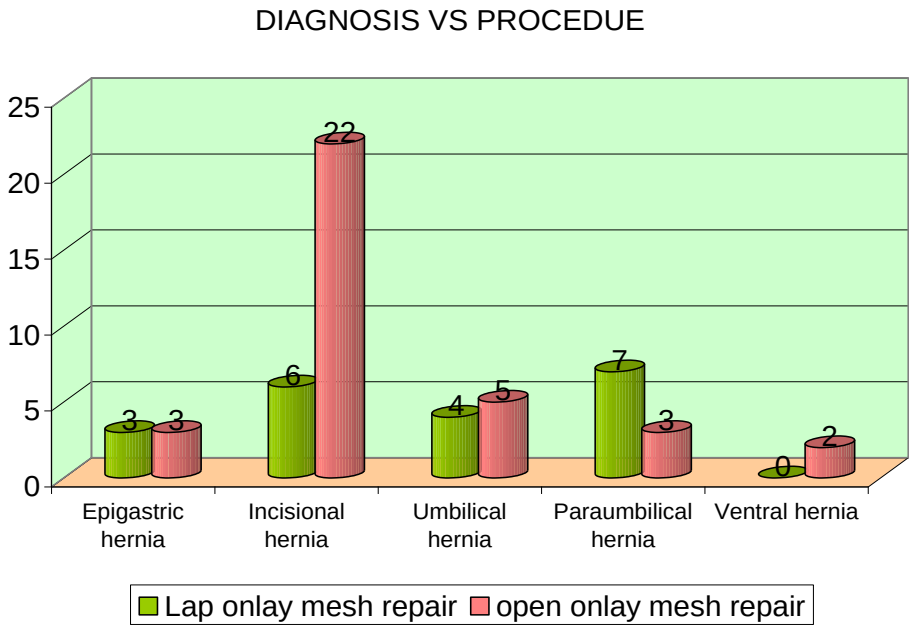
Among 55 pts , 28 pts are Incisional hernia, and 10 pts had Paraumblical hernia, 9 pts had umbilical hernia , 6 pts had Epigatric hernia, 2 pts had ventral hernia.



6. Diagnosis vs Procedure

Diagnosis	Lap onlay mesh repair	open onlay mesh repair
Epigastric hernia	3	3
Incisional hernia	6	22
Umbilical hernia	4	5
Paraumbilical hernia	7	3
Ventral hernia	0	2
Total	20	35

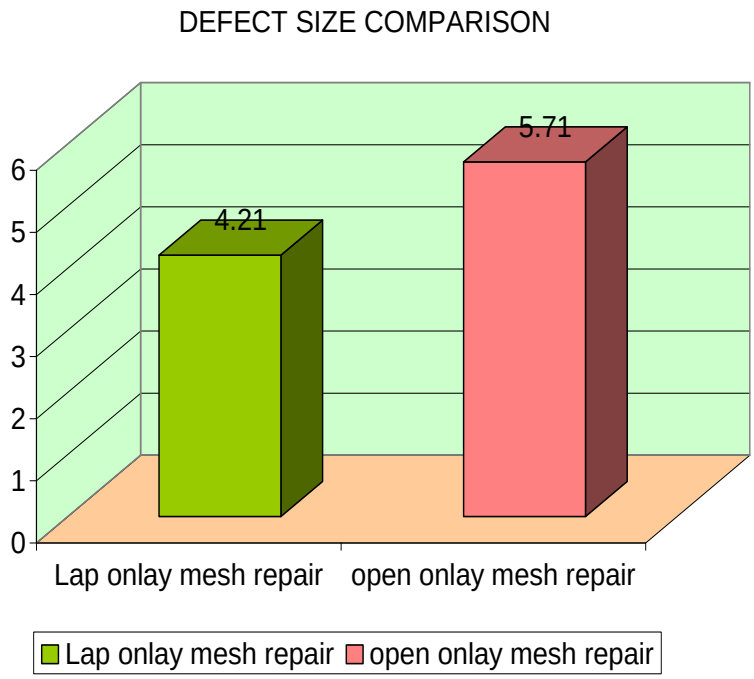
Among 55 pts 20 pts underwent lap and 35 pts underwent open mesh repair. Of which 6 lap incisional and 22 open incisional hernia mesh repair done



7.Defect size comparision

Defect size	Mean	SD	p value
Lap onlay mesh repair	4.21	0.92	< 0.001
open onlay mesh repair	5.71	1.77	Significant

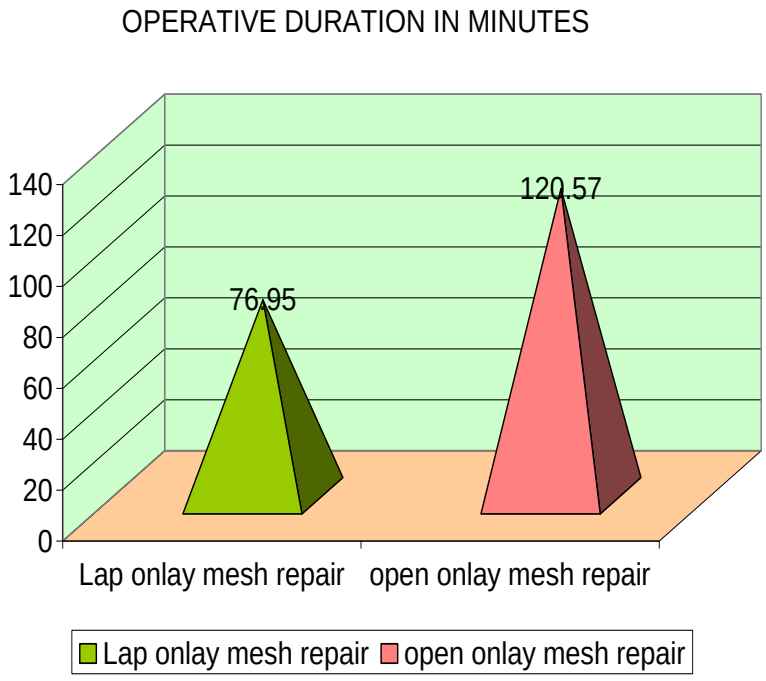
Mean defect size for lap mesh repair 4.21 and for open mesh repair 5.71 , with SD value for open 1.77 and for lap 0.92 with p value <0.001.



8. Operative Duration comparision

Operative duration in minutes	Mean	SD	p value
Lap onlay mesh repair	76.95	10.16	< 0.001
open onlay mesh repair	120.57	18.54	Significant

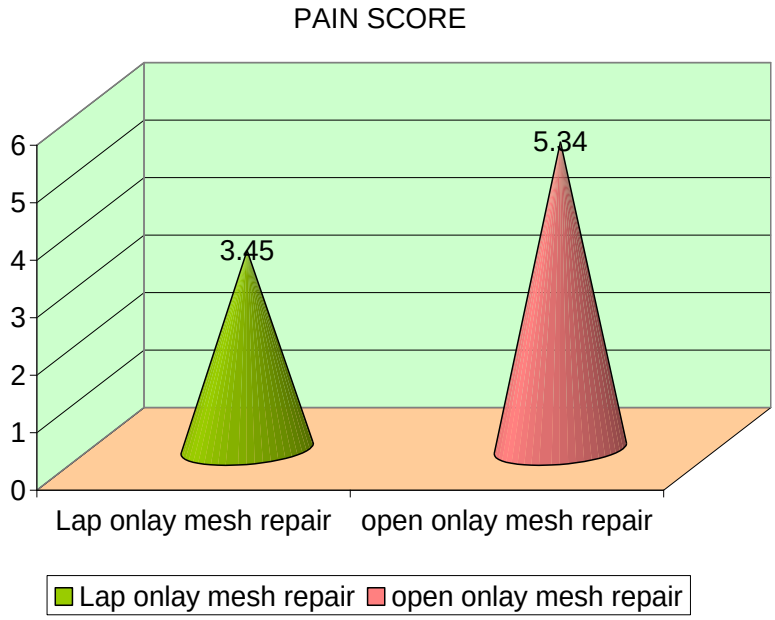
Mean duration for lap 76.95 minutes and for open mesh repair 120.57 minutes , which is shorter for laparoscopic group with p value <0.001.



9. Pain score comparision

Pain score	Mean	SD	p value
Lap onlay mesh repair	3.45	0.83	< 0.001
	5.34	0.68	Significant

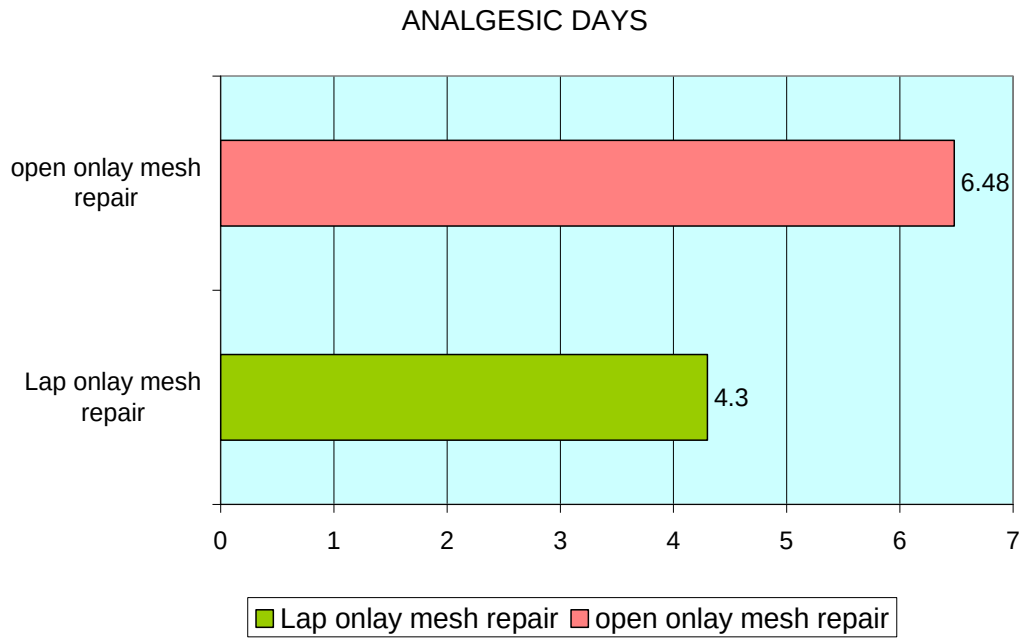
Mean pain score was less in lap group 3.45 vs 5.34 in open group with significant p value <0.001 in lap group



10. Mean Analgesic Days

Analgesic days	Mean	SD	p value
Lap onlay mesh repair	4.3	0.86	< 0.001
open onlay mesh repair	6.48	1.07	Significant

Mean analgesic needed for lap group was lesser 4.3 days and 6.48 days for open group.

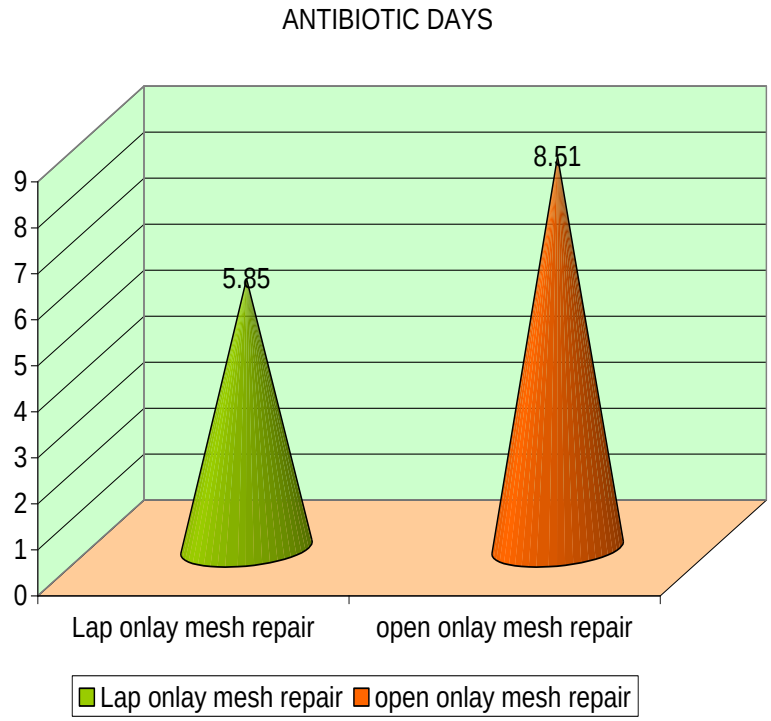


11. Mean Antibiotic days

Antibiotic days	Mean	SD	p value

Lap onlay mesh repair	5.85	0.93	< 0.001
open onlay mesh repair	8.51	1.56	Significant

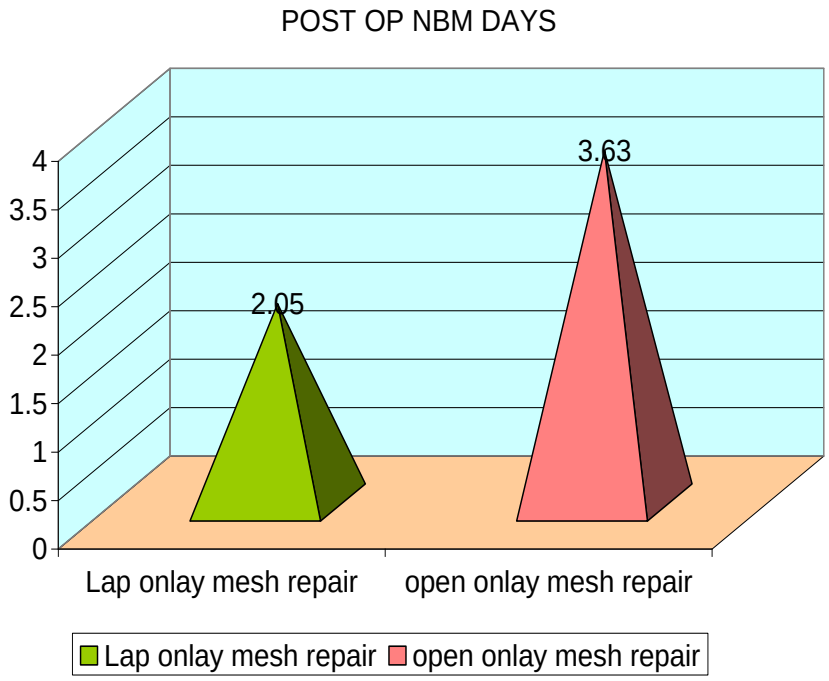
Mean Antibiotic needed are less for lap group than with open mesh repair.



12. Mean postop NBM days

Post op NBM days	Mean	SD	p value
Lap onlay mesh repair	2.05	0.61	< 0.001
open onlay mesh repair	3.63	0.49	Significant

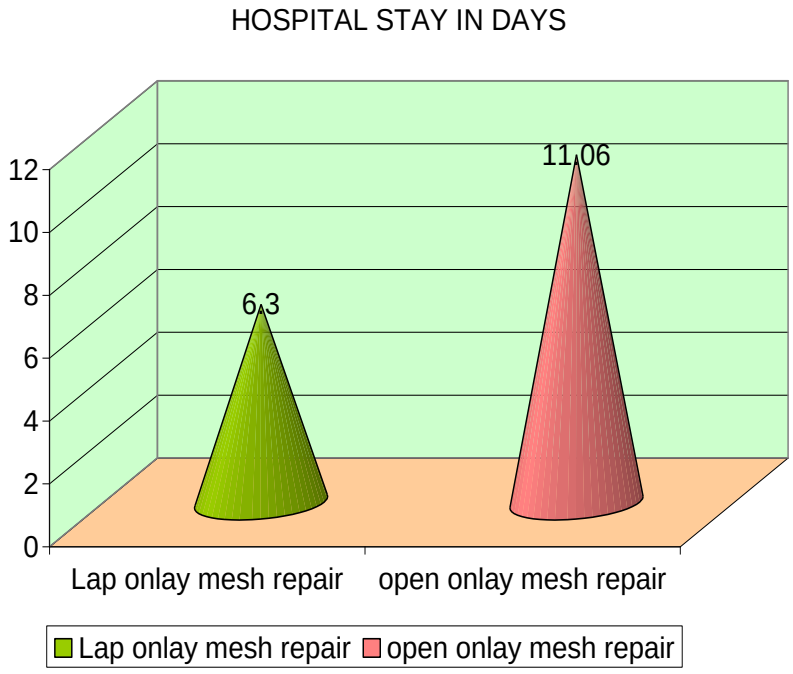
Lap pts had early oral intake compared to open mesh repair



13.Hospital stay in days

Hospital stay in days	Mean	SD	p value
Lap onlay mesh repair	6.3	1.49	< 0.001
open onlay mesh repair	11.06	1.64	Significant

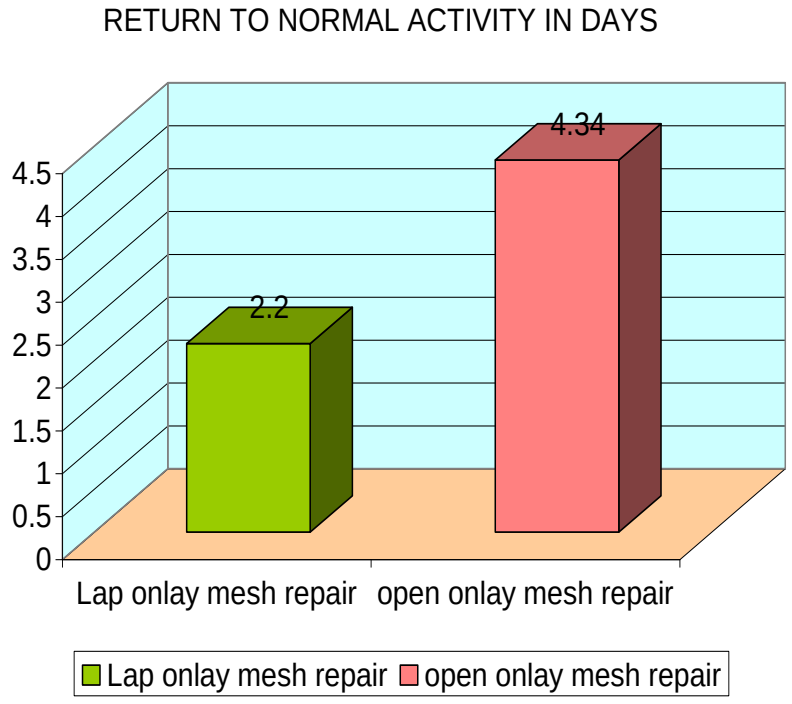
Lap pts had stayed less in hospital compared to open mesh repair



14. Return To Normal Activity

Return to Normal activity in days	Mean	SD	p value
Lap onlay mesh repair	2.2	0.62	< 0.001
open onlay mesh repair	4.34	0.8	Significant

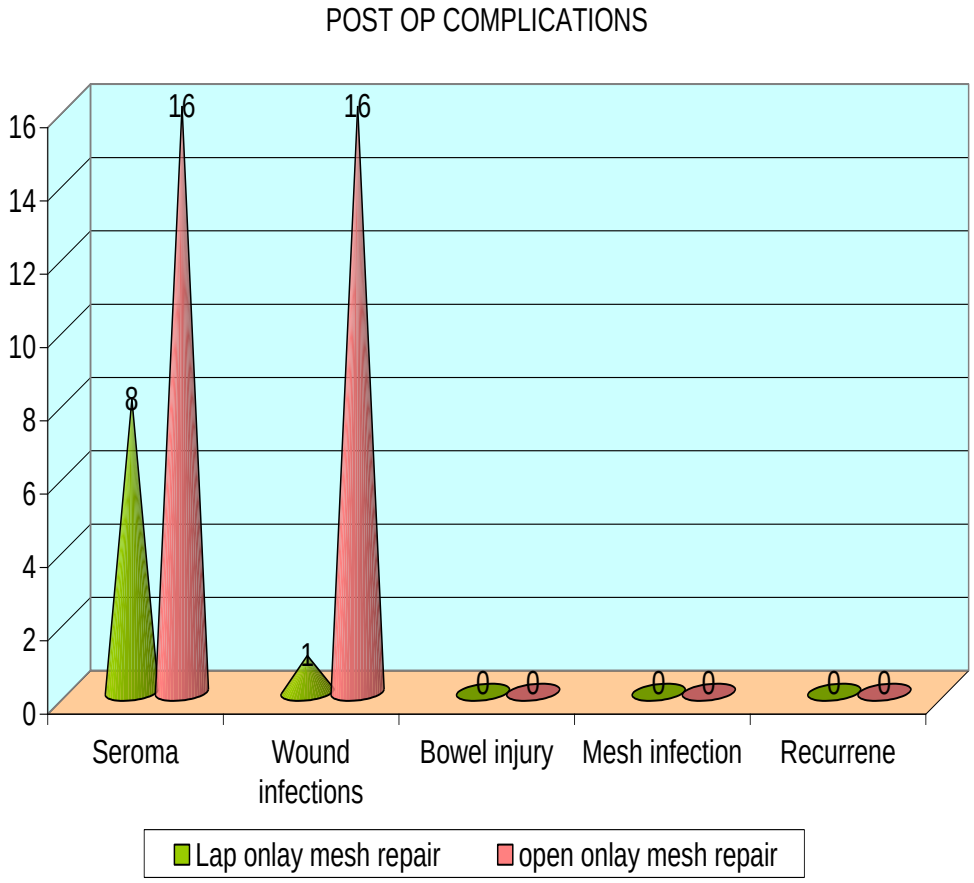
Return to daily routine was earlier in lap group compared with open mesh repair.



15.Post Op Complications

Post op complications	Seroma	Wound infections	Bowel injury	Mesh infection	Recurrene
Lap onlay mesh repair	8	1	0	0	0
open onlay mesh repair	16	16	0	0	0
P VALUE	0.898 NS	0.005 Sig			

Post op complications were less in lap group compared with open onlay mesh repair group.



RESULTS

The patients in the groups were comparable at baseline in terms of Age ,presenting complaints, the type of hernia in both laparoscopic and open hernia repair

The mean follow up time was - 12 months .

The study group consisted of 20 patients in laparoscopic ventral hernia repair (14 women and 6 men) with a mean age of 41.1 years and 35 patients in open onlay mesh repair (26 women and 9 men) with mean age of 48.1 years.

The parameters used to compare the both groups shows that patients in laparoscopic group had defect size of 4.21 cms comparable with patients in open hernia repair with defect size of 5.71 cms (p = < 0.001 , significant)

The mean surgery duration were 76.95 minutes for the laparoscopic repair and 120.57 minutes for the open repair (P = <0.001 , significant difference)

The mean duration of post operative analgesics used in laparoscopic group is 4.3 days as compared to open ventral hernia repair 6.48 days , with (p = <0.001) which is significant .

The mean post operative stay in hospital was shorter for the laparoscopic group then for the open hernia group (6.3 vs 11.06 days ; with p –value = < 0.001) which is significant.

Antibiotics used in laparoscopy group is for 5.85 days as compared to open repair 8.51 days (p = <0.001) which is significant.

Return to activity of normal daily work is significantly low in laparoscopic group as compared to open repair of ventral hernia (2.2 versus 4.34 days ; p = < 0.001) which is significant.

There were fewer intraoperative and post operative complications (seroma , wound infection , and entertomy) among the patients who underwent laparoscopic repair then among the those who had open ventral hernia repair.

DISCUSSION

Laparoscopic ventral hernia repair was started by LEBLANC in 1993 year , after that evaluations were done to make laparoscopic surgery easier and safest for ventral hernia repair , with use of laparoscopic approach large incisions and drain placement can be avoided.

The results of our prospective study revealed that as compared to open repair , laparoscopic repair is associated with shorter duration of surgery , reduced post operative analgesic requirement and antibiotic requirement.

Duration of hospital stay and return to the normal activity are significantly shorter for laparoscopic repair ,then for open

hernia repair. The reason for this is because of extensive subcutaneous dissection to have 5 cm mesh cover beyond the hernia defect , which causes more pain , longer duration of surgery , requirement of suction drain for longer period of time , and late return of normal daily activity. The complication rate for laparoscopic repair was very low.

The laparoscopic procedure was associated with potentially less wound infection and seroma formation as compared with open repair. Recent analysis also suggested minimal postoperative morbidity , a shorter convalescence period and an acceptable recurrence rates

The results of our study are quite comparable with studies done by Park et al , Carbaja et al , and Rameshaw et al and the following points were analyzed – TABLE – 1

Observation	Park11		Carbaja12		Rameshaw13		Our study	
	Lap	Open	Lap	Open	Lap	Open	Lap	Open
Operating time (min)	95	78	87	112	56	82	76.95	120.57
Length of stay (day)	3,4	6.5	2.2	9.1	1.7	2.8	6.3	11.06
Infection rate (%)	00	02	00	18	00	03	01	16
Seroma rate (%)	04	02	13	67	00	00	08	16

Patients	56	49	30	30	79	174	50	50

1. Mean duration of surgery (minutes)

Park et-al lap-95 , open – 78

Carbaja et al lap – 87 , open – 112

Rameshaw et al lap – 56 , open – 82

In our study lap – 76.95 , open – 120.57

with SD VALUE for lap – 10.16 and for open – 18.54 with p value < 0.001 , which is significant .

2. Mean length of stay (days)

Park et al lap – 3.4 , open - 6.5

Carbaja et al lap – 2.2 , open – 9.1

Rameshaw et al lap – 1.7 , open – 2.8

In our study lap - 6.3 , open – 11.06

3. Mean infection rate (%)

Park et al lap – 00 , open - 02

Carbaja et al lap – 00 , open – 18

Rameshaw et al lap – 00 , open – 03

In our study lap - 1 , open – 16

4. Mean seroma rate (%)

Park et al lap – 04 , open - 02

Carbaja et al lap – 13 , open – 67

Rameshaw et al lap – 00 , open – 00

In our study lap - 8 , open – 16

The results of our study strongly recommends that laparoscopic ventral hernia repair is the procedure of choice in an trained laparoscopic surgeons hands.

CONCLUSION

The present analytical study of comparative analysis and advantages of laparoscopic ventral hernia repair versus open ventral hernia repair was carried out at Government Rajaji hospital , Madurai during the period of June 2016 to August 2017

Based on the data and results obtained in the present study the following parameters were drawn

1. The average total duration of surgery is less by using laparoscopic intraperitoneal mesh placement
2. The post operative drainage is nil in laparoscopic approach
3. The post operative pain is less in laparoscopic approach
4. The postoperative complications are less in laparoscopic approach (seroma , wound infection , recurrence)
5. The shorter hospital stay in laparoscopic approach.
6. Early return to normal work
7. Early mobilization

8. It is even possible to reduce postoperative time , because of standardised techniques , surgeons getting more skill , and use of mesh fixation devices and newer mesh implantation.

So, laparoscopic ventral hernia repair is considered as first line of choice in ventral hernia repair.

SUMMARY

Analysis of laparoscopic and open ventral hernia repair in 55 patients , admitted in Government Rajaji Hospital , Madurai during the period of June 2016 to August 2017 year has been made and summarized below

- Total no of patients - 55 of which open -35 ; lap-20 ;

  out of it Male – 15 pts ; Female - 40 pts

- Mean duration of lap repair = 76.95 minutes

  Mean duration of open repair = 120.57 minutes

- Mean post operative pain score - lap – 3.45 ; open – 5.34

- Mean post operative seroma rate - lap – 8 ; open - 16

- None of the patient had Bowl injury

The findings demonstrate that laparoscopic ventral hernia repair in our experience was safe and resulted in shorter operative time , fewer complications , shorter hospital stay and earlier return to normal activity. Hence laparoscopic repair should be considered as procedure of choice for ventral hernia repair.

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PROFORMA

COMPARATIVE STUDY AND ADVANTAGES OF LAPAROSCOPIC VS OPEN VENTRAL HERNIA ONLAY MESH REPAIR

Name :- I. P. No

Age :- Unit

Sex :- D.O.A

Occupation :- D.O.D

Address :-
Phone no : D.O. surgery:

Previous Surgery: 1) Surgical scar site
2) Date of previous surgery

Presenting Complaints:

1) Swelling of size _____
2) Pain - Present / Absent
3) Vomiting – Present / Absent
4) Abdominal Distention - Present / Absent

Past History :

H/o DM/SHT/CAD/Epilepsy/BA/Thyroid disorder/P.TB

H/O Previous Surgery _____

General Examination :

PR - _____

BP - _____

RR - _____

Conscious _____

Oriented _____

Febrile _____

Pallor _____

Icterus _____

Pedal
Edema _____

Other Systems:

CVS – S1S2 +

RS – NVBS

CNS - NFND

EXAMINATION OF ABDOMEN :

INSPECTION:

1) Swelling - Size_____, Site_____,

   Shape_____, Scar Length_____.

2) Expansile cough Impulse - Present / Absent

PALPATION:

1)Warmth – Present / Absent

2)Tenderness – Present / Absent

3)Consistency_____

4)Expansile Cough Impulse – Present / Absent

5)Reducibility_____

6)Defect Size_____

7)Any Other Swelling_____

PERCUSSION:

Percussion over the swelling_____

Free fluid_____

Liver dullness_____

AUSCULTATION:

Bowel sounds – Present / Absent

INVESTIGATIONS:

Blood: Hb% _____ , Grouping and Typing _____
BT_____, CT_____
Sugar_____, Urea _____, Creatinine _____

Viral Markers:_____

Urine : Albumin _____, Sugar _____, Deposits _____

ECG _____

Chest Xray Pa view _____

USG abdomen&pelvis
_____
_____
_____

CECT Abdomen & Pelvis:

Preop Diagnosis:_____

Operative procedure: Laparoscopic_____/Open_____

Post-op Complications:

1) Bleeding_____
2) Seroma_____
3) Drain Collection
   Day1____, Day3_____, Day5_____, Day7_____
4) Wound infection – Present/ Absent
5) Wound gaping_____

Suture Removal: _____

Follow – Up at 2 wks, 4 wks, 3 months, 1 year
1)Recurrence_____
2)Wound infection_____
3)Mesh Infection_____

S.No.	Name	IP No.	Age	Sex	Diagnosis	Procedure	Content	Defect size	Operative duration in minutes	Pain score	Analgesic (days)	Anti biotic (days)	Postop NBM (days)	Hospital stay in days	Return to Normal activity (days)	Seroma	Bowel injury	Wound infection	Mesh infections	Recurrence on followup 1 year
1	Pandi	4840	50	M	Epigastric hernia	Lap onlay mesh repair	Omentum	3	65	2	4	6	2	5	1					
2	Kaladevi	68443	52	F	Incisional hernia	open onlay mesh repair	Omentum	8	130	6	6	8	4	12	4	+		+		
3	Pappa	64028	45	F	Incisional hernia	open onlay mesh repair	Omentum	10	145	6	6	8	4	11	3			+		
4	Vijaya	64001	50	F	Epigastric hernia	Lap onlay mesh repair	Omentum	5	70	4	3	6	2	7	2	+				
5	Muthalagu	62818	60	F	paraumbilical hernia	Lap onlay mesh repair	Omentum	3.5	68	4	4	6	2	7	2					
6	Chandrasekar	67831	41	M	paraumbilical hernia	Lap onlay mesh repair	Omentum	3	60	2	4	6	1	5	2					
7	Savithri	69495	28	F	Epigastric hernia	Lap onlay mesh repair	Omentum	5.5	85	4	4	6	2	7	3	+				
8	Muthulakshmi	68577	45	F	Incisional hernia	open onlay mesh repair	Omentum	9	135	6	6	10	4	12	4	+		+		
9	Murugesan	60548	54	M	paraumbilical hernia	Lap onlay mesh repair	Omentum	3.5	65	4	4	6	2	5	2					
10	Jamima Begam	63943	25	F	paraumbilical hernia	Lap onlay mesh repair	Omentum	4	78	4	5	7	2	7	2	+		+		
11	Subbulashmi	64364	55	F	Incisional hernia	open onlay mesh repair	Omentum	7.5	135	6	6	8	4	12	4	+				
12	Vellaiyammal	60851	41	F	Incisional hernia	open onlay mesh repair	Omentum	4	95	5	6	7	3	11	3					
13	Santhanam	62678	60	M	paraumbilical hernia	open onlay mesh repair	Omentum	4	105	4	6	6	3	10	3	+				
14	Chandra	63456	45	F	Ventral hernia	open onlay mesh repair	Omentum	5	125	5	5	7	3	11	4			+		
15	Kumar	67066	40	M	umbilical hernia	Lap onlay mesh repair	Omentum	4	70	4	4	5	1	5	2					
16	Kasthuri	69231	50	F	Incisional hernia	open onlay mesh repair	Omentum	7.5	120	5	6	8	4	12	5	+		+		
17	Jothirani	63428	40	F	Incisional hernia	Lap onlay mesh repair	Omentum	4.5	80	4	5	7	3	6	2					
18	Ramarkodi	63112	40	M	umbilical hernia	open onlay mesh repair	Omentum	3.8	95	5	6	7	3	5	3			+		
19	Arulananthan	60148	68	M	Ventral hernia	open onlay mesh repair	Omentum	8	140	6	6	10	4	12	5	+		+		
20	Jeyanthi	61261	60	F	paraumbilical hernia	open onlay mesh repair	Omentum	6.5	110	5	6	8	3	10	3			+		
21	Pandiammal	61342	39	F	Incisional hernia	Lap onlay mesh repair	Omentum	3.5	70	4	4	4	2	6	2	+				
22	Vasantha	62314	62	F	Incisional hernia	open onlay mesh repair	Omentum	3.8	90	5	6	7	3	8	4					
23	Logeswari	60614	52	F	Incisional hernia	open onlay mesh repair	Omentum	4.5	95	5	6	7	4	10	4	+				
24	Mayandi	61511	52	M	umbilical hernia	open onlay mesh repair	Omentum	4.8	100	4	5	6	3	9	4	+				
25	Kiruba	62344	35	F	paraumbilical hernia	Lap onlay mesh repair	Omentum	3.4	65	3	5	6	2	6	2					
26	marimuthu	62574	39	M	Epigastric hernia	open onlay mesh repair	Omentum	4	95	4	6	7	4	12	4					
27	Anithasankari	64381	33	F	Incisional hernia	open onlay mesh repair	Omentum	5.5	120	4	6	7	4	12	4			+		
28	Ettammal	60345	60	F	Incisional hernia	Lap onlay mesh repair	Omentum	6.2	98	5	7	8	4	11	4	+				
29	Pappa	62181	45	F	Incisional hernia	open onlay mesh repair	Omentum	4.5	95	5	8	8	3	11	5					
30	Vellaisamy	64531	55	M	Incisional hernia	open onlay mesh repair	Omentum	6.5	130	5	8	9	4	12	4					
31	Alagarsamy	60196	46	M	umbilical hernia	open onlay mesh repair	Omentum	3.5	100	6	8	9	4	12	5					
32	Kaladevi	63036	52	F	Incisional hernia	open onlay mesh repair	Omentum	8	145	5	8	8	4	12	5			+		
33	Madhavan	64836	33	M	Epigastric hernia	open onlay mesh repair	Omentum	4	130	6	8	9	4	12	5	+				
34	Muthukavitha	61332	30	F	Incisional hernia	open onlay mesh repair	Omentum	6	125	6	8	10	4	12	5	+				
35	Pandiammal	62272	42	F	Incisional hernia	Lap onlay mesh repair	Omentum	6	80	4	5	6	2	5	2					
36	Selvi	61879	39	F	Incisional hernia	open onlay mesh repair	Omentum	4.5	110	6	5	10	4	11	5					
37	Mani	60374	54	M	umbilical hernia	Lap onlay mesh repair	Omentum	4	85	2	4	5	2	6	2	+				
38	Priya	60879	30	F	Incisional hernia	open onlay mesh repair	Omentum	6	145	6	8	12	4	14	5	+		+		
39	Murugesan	62037	45	M	Epigastric hernia	open onlay mesh repair	Omentum	4.3	140	6	8	11	4	12	4			+		
40	Renugadevi	62058	59	F	Incisional hernia	open onlay mesh repair	Omentum	8	150	6	8	10	4	12	5	+				
41	Anuradha	63133	36	F	paraumbilical hernia	Lap onlay mesh repair	Omentum	5	80	3	3	6	2	6	2					
42	Murugan	62914	38	M	umbilical hernia	Lap onlay mesh repair	Omentum	3.5	75	3	4	5	2	6	2					
43	Sekkammal	60918	60	F	Incisional hernia	open onlay mesh repair	Omentum	5.5	135	6	7	12	3	14	6			+		
44	Pechiammal	64358	60	F	umbilical hernia	open onlay mesh repair	Omentum	4.5	135	5	5	8	3	10	5					
45	Dhanalakshmi	64212	53	F	Incisional hernia	open onlay mesh repair	Omentum	6	125	5	5	7	3	10	4	+				
46	Ranjitham	65117	59	F	umbilical hernia	open onlay mesh repair	Omentum	4	115	5	5	8	3	10	3	+		+		
47	Jeya	61671	35	F	Incisional hernia	Lap onlay mesh repair	Omentum	4	90	4	5	7	2	9	3	+				
48	Chinnammal	62418	55	F	Incisional hernia	open onlay mesh repair	Omentum	6	105	6	6	10	4	12	5			+		
49	Thamilselvi	61445	30	F	paraumbilical hernia	Lap onlay mesh repair	Omentum	4	85	3	4	5	2	6	2					
50	Malarvizhi	63242	36	F	Incisional hernia	Lap onlay mesh repair	Omentum	4.5	80	3	4	5	2	5	3	+				
51	Pothumponnu	65819	37	F	paraumbilical hernia	open onlay mesh repair	Omentum	4	95	6	7	10	4	12	5					
52	Meenambal	66281	40	F	Incisional hernia	open onlay mesh repair	Omentum	6.5	135	5	7	8	3	10	5	+				
53	Palaniammal	66899	29	F	paraumbilical hernia	Lap onlay mesh repair	Omentum	4	90	3	4	5	2	6	2					
54	Thangam	68832	50	F	Incisional hernia	open onlay mesh repair	Omentum	8	140	6	7	8	4	10	5			+		
55	Selvi	64962	38	F	Incisional hernia	open onlay mesh repair	Omentum	4	130	5	7	10	4	10	5	+				

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ETHICS COMMITTEE CERTIFICATE

Name of the Candidate	:	Dr.S.Umamaheswaran
Course	:	PG in MS., General Surgery
Period of Study	:	2015-2018
College	:	MADURAI MEDICAL COLLEGE
Research Topic	:	Comparative study and advantages of Laparoscopic ventral hernia mesh repair versus conventional open mesh repair
Ethical Committee as on	:	16.03.2016

The Ethics Committee, Madurai Medical College has decided to inform that your Research proposal is accepted.

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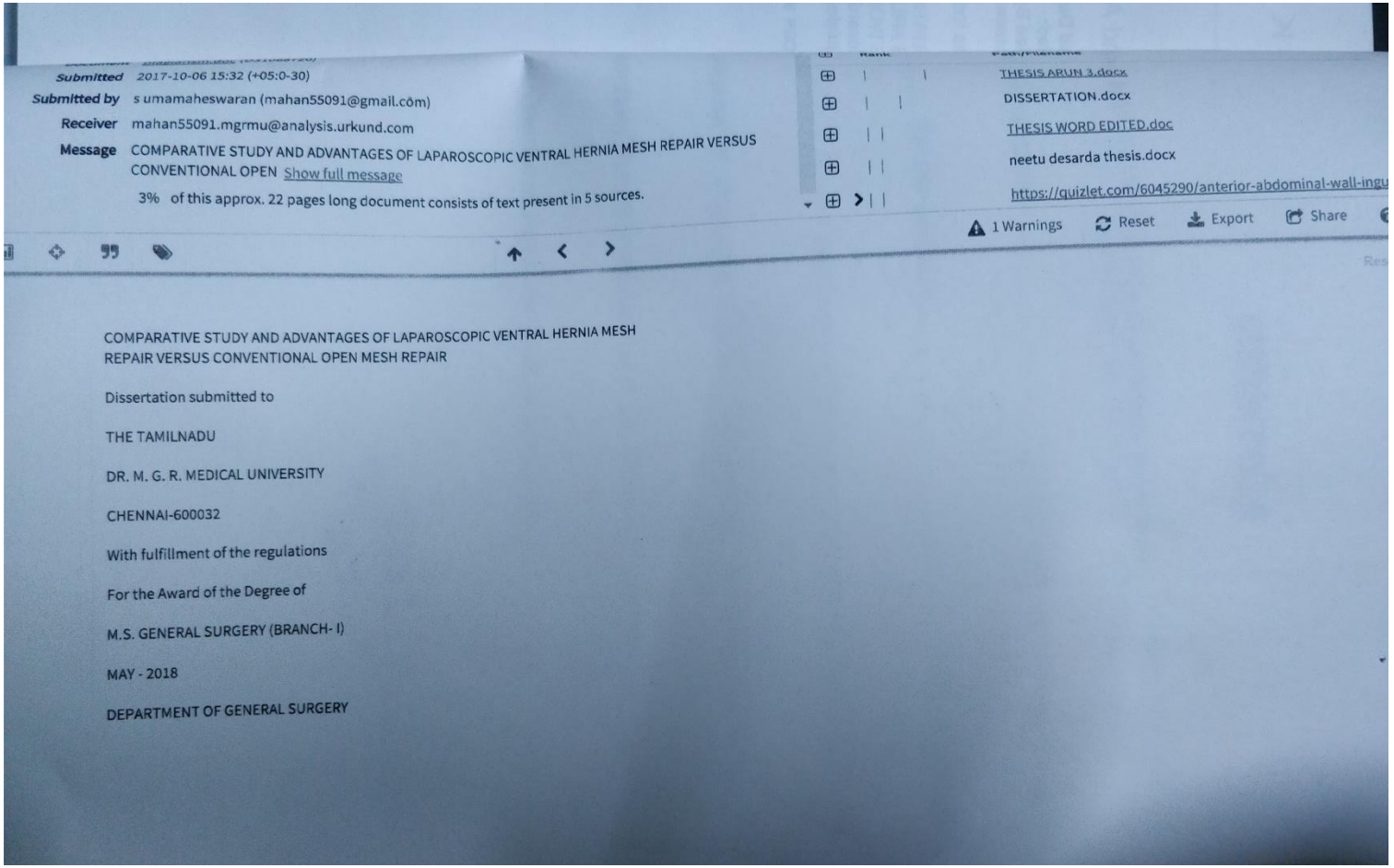
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